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The Institute of Dental Pedagogics

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Eleventh
~~Tenth~~ *Annual Meeting*
Held at Buffalo, N. Y.,
Dec. 28, 29 and 30, 1903.

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Tenth Annual Meeting of the Institute of Dental Pedagogics.

Some Faults of the Prevailing Dental Training.

By J. D. Patterson, D.D.S., Kansas City, Mo.

President's address

In directing attention to this subject I must disclaim any intention to criticise without an ultimate object, and that is to assist in the correction of errors which seem to have been grafted firmly upon the system of dental education. "It is easier to be critical than to be correct," said a noted Englishman, but it must also be remembered that unless there is weakness in the thing criticised there can be no strength in the criticism.

The faults which I desire to mention and comment upon may be divided into two classes:

First: Faults fostering a low grade of professional spirit.

Second: Faults in the methods of practical and theoretical instruction.

Dentists Not Respected by the Public.

It certainly needs no argument to support the statement, when I say that the public does not accord to our calling the need of respect and honor which we believe it demands on account of the benefits it confers in giving comfort to human beings, and which it does accord to ministry, the law and to medicine. I think I am safe in asserting that

Reprint from Items of Interest.

each of us has repeatedly suffered from some humiliation caused by slighting allusion to the status of the dental practitioner. Is it deserved? I think it is. Can this be corrected? I firmly believe that within a quarter of a century public opinion can be moulded aright in this matter, and I believe it is the duty, within the province, and perfectly possible, that the Institute of Dental Pedagogues can bring about the change.

In proof of this statement I place before you the following summary of facts: *In any profession its dignity and high regard in the eye of the public must ever be dependent upon the individual personal influence of each of its members.*

The public cares nothing for us save as individuals, or groups of individuals, but the individual gives the true standard of respectability of the profession to which he belongs. Now where does the responsibility lie in the selection of individuals and the moulding of them who will hereafter dominate the standard of the dental profession? Does not the responsibility lie with this association?

In these times, no one (save in isolated cases) can gain entrance to the dental ranks save through the medium of the Dental College. The faulty result of dental teaching lies either in accepting unfit students or in the faulty teaching of those students. The teachers are the ones who determine or advise what the preparatory ability of a student must be as well as guiding him after acceptance, for in no one of our colleges is the business management separate from the teaching force. You may declare that this association is solely devoted to elaboration of teaching methods and that the questions of legislation and administration lies with the Faculties Association and should not be touched upon here. In answer I will say that the divorcement of the consideration of methods of instruction from the consideration of methods of administration in my opinion is an impossibility. The segration of related interests in our professional advancement is unwise, and if this association is in fact, as well as name, a National one, no discussion of teaching methods is logical if prominent factors in dental education are tabooed.

Faculties Association Derelict.

Again, the National Association of Dental Faculties whose objects are supposed to be varied, among which is the subject of legislation, administration and police control over dental education, *is a legislation body which too often does not legislate; an administrative body that does not administer,* and whose requirement of obedience to rules is elastic, varied to suit the individual case. The Faculties Association in late years has made the mistake of apparently believing that better dental education is measured by increase in the length and number of courses instead of making a better selection of talent and acquirement. The prediction is hazarded that extension of number and length of courses will tempt to accept still more of kindergarten material with the idea that the lengthened time will allow for making up deficiencies.

The desired work of improving the standard of the graduate cannot be left to that association, for it has not been faithful to its trust. I speak with all calmness and certitude, and the record will substantiate me in stating the claim that since the Faculties Association in 1897 in an illegal manner abandoned the advanced standards which it had adopted in 1896 and which advanced standards in their elaboration would unquestionably have brought a rapid advance in the professional standard in dentistry—that association cannot be credited with any advance towards making our calling dignified and professional. The average intelligence of the student in late years has not improved, and a same dead level of indifference to everything but a diploma and the money it will enable them to grasp, exhibits itself in the great majority of those we are called upon to instruct. The result is the multiplication of low grade practitioners, who in their student hours give a smile of derision when an enthusiastic teacher pleads for a high plane of living and doing in dental professional life, and whose name after graduation is found in the cheap advertising page, or as the employee of the "Dental Parlor" proprietor. As the years have gone along it has been the hope of the enthusiastic that the personelle and intelligence of students would steadily improve. To those who have carefully observed the subject the hope has died, and they turn to seek a new and different force for uplifting. The treason of 1897 and its results stamps distrust on the idea that any good along the desired lines shall come out of the wisdom of the Faculties Association.

To what agency then shall we turn in the emergency? *Undoubtedly to this Institute.* It is not my purpose to advise this body to legislate, but it can so advise and *insist upon reforms that reform will be brought about.* If each individual in this body will pledge himself to demand better material, that can be moulded into gentlemanly behavior, as well as superior, practical acquirement, there *must come a practical result.*

Count System of Credits.

Under the first heading the second error I will note is that of ignoring the Count System of Credits, both in preliminary requirements and in the actual training. This will only receive a brief attention.

It seems strange that when a perfectly feasible method of positively perfecting credits for acceptance and advancement is at hand, that it has been rejected by an almost unanimous voice in the Faculties Association in 1897, and the same fate will probably be given to the measure in 1904. We crave the careful consideration of every member of this institute to this measure and his support for its adoption in dental education, so that credits either for preliminaries or advancement shall be *alone by merit for work accomplished* and certified to and not at the behest of individual minds or for any purpose ulterior to the best in dental education. Every member of this institute should support the movement which is again attempted, and endeavor to place dental education on the same basis of credits which has been adopted by the best literary and professional systems in the old and new world.

The Teaching of Dental Ethics.

The third fault which I notice under the first head is that our teachers do not teach professional ideas and duties sufficiently. They should make it convenient to frequently explain what constitutes a profession—why dentistry is a profession—should combat unprofessional ideas, and illustrate how degrading is their influences. It should be taught daily that no profession more demands the gentleman than ours. *This teaching should be a keynote.* There are those in our classes, who otherwise are acceptable students, but whose knowledge of the duties, and obligations pertaining to professional life is entirely wanting or at best is extremely vague. To them it must be taught and *earnestly* taught. The teacher must do this both by precept and example, for each one must remember that *"professions pass for nothing with the experienced when connected with a practice that flatly contradicts them"* The teacher by personal example then must teach professionalism. If they cannot, or will not do this, there is, in my opinion, no place for them on the lecture rostrum in the laboratories or the infirmaries of a dental school as instructors of young men who some near day must necessarily dominate the profession of our choice and by their fruits decide whether its future shall stagnate, retrograde or improve. When our eyes view the average grade of intelligence in our graduating classes of today tend the will of the duty of professional men is there not often a shiver of apprehension? The question surely demands a very careful consideration from members of this body.

The Rejection of the Unfit.

Lastly under this head we come to the fault in dental education which is presented in the fact that when dental students give positive evidence of their unfitness for the profession, they are usually encouraged to continue instead of being earnestly advised to abandon the work, or even commanded to do so. In earlier days the apprentice system did the winnowing, and the student who was unfit was so advised and discharged from the office of his preceptors. Personally I know of two such cases in the office of one of my preceptors in 1865 and 1867, and I know of other instances. This, it must I think be acknowledged is an admirable feature of the apprentice system and one of the reasons which has caused the writer to advocate that system as a prelude to dental college training. In the college this winnowing has not been accomplished. The student, without his own knowledge, or the knowledge of any one else, as to his fitness for dentistry, very often comes to the college from a long distance under a considerable expense, with ideas undefined except as to the curious belief that dentistry affords *"an easy way to make money,"* and when he finds himself mistaken it is usually impossible or impracticable to recede, for money has been expended and the expectation of relatives and friends must not be disappointed. He must "Willy Nilly" proceed. He does so, and the profession is burdened with his compelled presence. Every teacher in this association should *strongly* advise the unfit student at the earliest possible time to seek other avenues of life work, even if it is at considerable sacrifice. The apprentice system is evidently impossible as a compulsory measure in this country; the sentiment is, I think, strangely against it; therefore, if a student leaves the work after entering college, it will be by the teacher's advice. I *counsel to give such advice.* If it is given through correct motives and on unmistaken evidence, it will, I assure you, usually be followed, and the teacher will thus do his share to mitigate this faulty and unfortunate situation.

Diverse Teaching in College Courses.

Under the second head of this division of our subject we come to the fault found in the lack of co-operation and uniformity in methods between lecturers and demonstrators. In the major part of teaching there is a standard which should admit of little variation or at least of unimportant variation, but we are confronted with the fact that the lecturer advises certain lines of practical procedure or gives a theory which in the laboratory or infirmary is diametrically opposed or seriously modified by the demonstrator. So has arisen much confusion and has lead the student to uncertain results. Such is not the case when the professor superintends in the infirmary what is said from the lecture stand, but personal observation teaches that very, very often the lecturer is not a visitor to the infirmary or the laboratory, and those demonstrating do not harmonize with what has been said from the lecture stand.

Again, different demonstrators recommend and direct opposite procedures when only one method should prevail. This fault should be corrected by the selection of only experienced teachers—and frequent faculty meetings in which the teaching should be so far as possible along uniform lines. This brings us to the fault of employing men as teachers and demonstrators who are of indifferent skill and limited experience, and who are secured at a salary which never can obtain the best service.

Lack of Demonstration.

The next fault we notice, and a most noticeable and direful one, is a too limited number of demonstrators in laboratory and infirmary. The instruction and detail in practical work can never receive the necessary supervision which is due the student and which is absolutely necessary while one demonstrator has under him so many pupils and so many operations which demand his attention in the same hour. Personal experience and close observation convinces me that this fault is most serious. I have never entered laboratory or infirmary in the college which I am connected, or in those of other schools members of this association, but I am confronted with this fault. Each demonstrator in the busy hours on account of the number of students under him has so many demands upon him that if he devotes necessary time to a few, the many are neglected, and if he endeavors to direct all, he does it so imperfectly and hastily that nothing is done satisfactorily either to himself—the student, or the patient. I hear you say that this is well known and admitted, but why find fault unless a remedy is offered? Very true—the criticism lies—but I do propose a remedy and the remedy must be in increasing the tuition fees so that additional and experienced teachers may be provided.

College Fees Should Be Increased.

These faults last noticed, viz.: employing as teachers men of indifferent skill and limited experience; who can be secured at a low salary; and upon whom we place work enough for double the number, can only be remedied by securing the means requisite to employ the best skill, matured by wide experience, and in number sufficient to thoroughly supervise and direct each student.

Is the means now at hand? I think not. Experience has taught me that usually the colleges have provided as many and as expensive teachers as the dues paid will permit. Those who think differently are usually those without experience in the financial affairs of dental colleges. This being true, what other remedy have you to offer. The best teaching talent *cannot* be secured in these days without competent remuneration—their number *cannot* be increased without the increased income. Let us provide the means. Let us relegate the under graduate and the recent graduate teacher to where he belongs—to the world of experience and give to those competent men who now teach, a proper fee and secure others of talent and experience to assist them.

I therefore bespeak the effort of each individual in this institute to a sufficient increase in tuition fees. I believe a united effort would convince all concerned that this can be done, and that it would be a step in advance of greater benefit than adding another year to the course. The foreign dental schools of prominence usually receive a fee of £50 per term, nearly $250 of our currency, and their expenses are less because they do not require the equipment for practical work which is so expensive, as their students receive that instruction under their preceptors to whom they are indentured. Why should we not profit by their example in this matter of tuition? At any early period in the history of dental education when teachers, many of them engaged in teaching without money recompense because they deemed it a professional duty to instruct new men to meet the great need of dental service, and when students were not so numerous, the fees for tuition were placed at a nominal sum. It was all that was required at that time--the fault has been that they have not increased with the demands of the day, which compels larger outlay for competent dental instruction. The salary list of the really competent demonstrators who give the college a larger portion of their time in every college I have investigated, is grossly inadequate and the position is not retained long by them and is used as a "pot boiler." This is a fault. The salary of the competent should be commensurate with a dignified position. Of the *incompetent* and inexperienced what shall I say? College men declare that they are unable to avoid their employment; that they cannot afford to pay the best men very well. Let us concede that this is true, and let us rapidly place ourselves in a position to afford the best, for of all departments of dental teaching the demonstrator is the one who should without exception be at the front rank.

At the last annual meeting of this Institute, Dr. E. J. Darby made a statement which created something of a sensation. He said, referring to the earlier dental college training, "*We made better dentists then than now.*" He referred to the practical work then and now. The observation was made by a careful man who had no remote idea of stating anything but what expereince and observation warranted. I think the statement true and that the older men of this association must subscribe to Dr. Darby's opinion. Personal observation and contact has taught the writer the utter helplessness of the majority of students who have come to the end of their college course—when confronted with practical cases a little out of the ordinary. What has caused this condition? Is it not caused by some of the faults above noted? In early years when the student came up for graduation at the end of one or two years, he almost invariably came to the college with practical experience, gained from a private pupilage usually, and this advancement has not found its prototype in college training. The college has failed to "make good" in this matter. Students are herded together, known by a number. The shepherds are too few and many of them incompetent, and that personal supervision which is so ncessary in a calling which is so largely mechanical and which requires personal and repeated direction for the attainment of manipulative dexterity has not been afforded. The question is certainly a vital one. If the college training in any department is sending out a product inferior to that of past years, it is certainly time to make a reckoning and find the fault. Is the practical instruction deficient? The theoretic curriculum too burdened? or the student of such inferior moulds that the finished product is misshapen? These are questions for this Institute; they will not be settled elsewhere.

In concluding I thank you for the honor you have given me in electing me to the highest office in this association. I am very jealous of the distinction. I hope that our conferences at this annual meeting will result in improvement individually and collectively.

Discussion.

Dr. R. H. Hofheinz,
Rochester, N. Y.

The question of education will always remain a fruitful text for unlimited discussion for any gathering of this kind.

I have been asked to discuss the paper of our worthy President, but after looking over the epitome he sent I could find little to discuss. My views coincide so much with Dr. Patterson's that I can only reiterate his opinions and recommendations in my own language.

The Doctor divides his paper into two great halves: The deficiencies which arise (1) from a lack of education before entering college; (2) from faulty instructions after having entered college.

To accept students of inferior preliminary education is the greatest fault I can find with all our dental educational systems. This question alone should suffice for a good long essay. No additional years of college or university teaching can compensate for the defectiveness of early intellectual training.

The Germans demand nine years of Gymnasium before they consider the mind ripe for university lectures. The introduction of a four years' university course can never compensate for early deficiencies. The mind must have proper shaping in youth to form an intellectual storage battery for our university teachings, and I am almost inclined to think it more important for dental students than for any other. Most of the scientific studies require a cerebral effort only; whereas, in our case, the manual, the technical development consumes much of our college time. It is the early part of life which is a period of plasticity, a period of adjustment—of a physical adjustment—and then an adjustment on a larger and broader scale.

N. M. Butler says: "There are in the United States no obstacles interposed between the college and the university. We make it very easy to pass from the one to the other; the custom is to accept any college degree for just what it means. We make it equally easy to pass from one grade, or class, to another, and from elementary school to secondary school. The barrier between secondary school and college is the only one that we insist upon retaining."

Gentlemen, it is, however, not only the quantity of preliminary knowledge which proves a telling factor in our dental education; it is the quality which our president has well emphasized.

Three years ago I chose this question for a paper before the National Dental Society. My opinion on this subject remains unchanged and I take the liberty to quote from aforesaid paper:

Manual Training.

"I make the broad statement that a student who under favorable conditions has not developed some manual skill at the age of eighteen—the time for college entrance—does not possess the physical requisities of a good dental operator. In my estimation we should be in position to judge the physical the same as the mental equipment of the dental student previous to college entrance. The student who is not naturally endowed with a reasonable amount of manual ability will never become the dental operator so much needed."

Manual dexterity is but the evidence of a certain kind of mental power, and it should go hand in hand in its early development with that of the mind. This education belongs to the secondary schools, and if this quality is insisted upon as a preliminary requisite, the possibility of unfitness during college life, of which Dr. Patterson speaks, is reduced to a minimum.

Professional Ethics.

Much stress is laid in Dr. Patterson's paper upon the fact that professional ideas are not sufficiently taught in colleges; that the teachers are lacking in the proper spirit of directing the students toward professional honor and ethics. I am of the opinion that you may teach ethics in dental colleges to a large number of students until Doom's day without accomplishing the desired result.

Why? Professional instinct, reverence for scientific achievements, the proper feeling for ethical culture, belong largely to early home training and proper, elevating environments outside of a college. The young man, endowed by Nature with a spirit of commercialism, the predominating characteristic of our time, can never grasp the meaning of professional refinement at the age of twenty, no more than the man who enjoyed "rag time" music only, up to that time, can ever really appreciate the celestial meaning of a Beethoven adagio. The wrong in this direction is usually done, and permanently done, before the student enters a dental college. This, however, does not deny the necessity of ethical teaching in our colleges, and I should consider myself very inefficient in performing my duty, did I not constantly endeavor to lead the student's mind to a proper and correct understanding of professional honor.

There is no better mode of showing proper professionalism to the students than the conduct of your own practice. This is the best object lesson you can give students at that time of life. Nothing will impress the students with a higher regard for professional loftiness than the success which a teacher has to show through the application of these very principles.

All teachings of ethics in the lecture room smack of absurdity and lack sincerity, if not properly sustained by the teacher's own methods in practice. The man who cannot show through his own conduct in life the very pathway to ethical professional success, has no moral right to pose as a teacher.

Demonstrators.

The other great fault Dr. Patterson finds in college teaching is the inefficient number, and, often, poor quality of demonstrators. This is certainly a most vital question. A large number of our dental colleges are without endowments, and therefore exclusively dependent upon the income from the students, a condition which necessitates economy and very often in the wrong place.

I would rather have one competent demonstrator in my infirmary than half a dozen incompetent ones. I have often endeavored to settle the relative necessity of one demonstrator to a certain amount of students, but I found it impossible, owing to the difference in the quality of students which each class presents. The consensus of opinion of our demonstrators and myself is, one demonstrator to ten students. I have repeatedly seen one student able to keep all the demonstrators busy which our university could furnish.

There is but one ideal way of teaching, and that is to study the individuality of your student and teach according to its demands. If I were rich enough I should create a fund for that purpose and prove to you results such as Froebel has given to the world in his kindergarten system. I never have and never will permit any difference of infirmary practice from my method of didactic teaching. Dentistry is not a very broad profession, but it certainly permits numerous ways of execution. It is utterly impossible, without confusing the minds of beginners, to teach definitely more than one system, and that should be one based on successful and progressive methods. Other operative methods should be alluded to and teaching should thus be cosmopolitanized, but neither the mind nor the hand of a student should be allowed to wander in all directions, without a positive method, which must prove the foundation for all possible future ramifications.

If what Dr. Darby said is true, that "We made better dentists then than now," it is our duty to find the cause of such retrogression. The proper way to reach that end is by such frank presentations of our faulty methods as Dr. Patterson has given us, and by intelligent criticism of such faults.

No profession has made such wonderful progress in a short time as ours. A time for proper assimilation is needed, after which we will replace that statement of Dr. Darby's by one which will tell the world that we are making better dentists now than ever.

Dr. John T. Hart, New York City.

We are extremely fortunate in the character of address just delivered by our President. He has abandoned the conventional and blazed a new field of his own. He has handled the subject of high ideals in a manner essentially practical and I for one feel deeply indebted to him.

No system is so perfect but that it is susceptible of improvement. The fact that this body of busy men congregate here for no other purpose than the advancement and elevation of dental education is an encouragement in itself, and the most pessimistic must admit that if faults exist they have only to be recognized and their causes defined to lead to their correction.

The main difficulty lies in agreeing as to these causes.

In the last few years we have departed so rapidly and radically from early methods of dental education that practically a student of today is trained in a manner along fundamentally different lines from those which formerly existed. That this is not entirely satisfactory those who agree with the address just read must admit. Formerly, prospective dentists were received as students in an office for a certain period of time prior to entering college. This method possessed two advantages; it enabled the experienced practitioner to observe manual weaknesses in the student and to tell him and those interested in him of the advisability of his choosing another calling. It also gave the student more and greater individuality than is possible today. In this way the weeding process commenced before the student was committeed to dentistry as his permanent life work.

Need of Manual Training.

The number of students precludes the possibility of continuing on these lines and present methods of education have supplanted the older ones, but it throws a responsibility on dental educators which they must not and cannot shirk. Your essayist says truly that the first fault is in accepting students of inferior preliminary requirements. This proposition must be regarded in its broadest sense; we are hide bound as to the prospective student's minimum literary education, but nothing is said as to his or her manual dexterity. So long as the standard of admission into the educational department of a profession which is mechanical as well as theoretical is purely literary, so long will we have a large proportion of disappointments and failures. I would rather teach a student of ordinary literary ability, but trained manually, than a Master of Arts with no manual training. With as much reason should a professor of chemistry be expected to teach a student arithmetic so that he should be able to work out a chemical equation, as that the departments of operative and prosthetic dentistry should be required to find out, after a student has been duly entered, whether he has the manual ability to perform his required work. No extension of the number or length of courses will stand in lieu of entrance requirements.

The records of our school will show that we have in several instances advised students against continuing to study dentistry, and in some instances absolutely refused to permit them to continue with us, but how much loss and chagrin could have been saved them, if, instead of finding this out after a waste of time and money they had been stopped at the threshold. I suggest that we require evidence of manual as well as mental training before accepting dental students.

If we can prepare individuals more thoroughly, we will have less ground for fear that they will go wrong ethically. A student who has spent three years acquiring a dental diploma and is then unsuccessful in practice building, has not the moral courage to enter another calling, but, unfortunately, is attracted by methods which he may abhor.

Ray Stannard Baker says truthfully: "The difficulty with constitutions and by-laws is that they regulate everything except human nature." Our difficulty in bringing up students to be ethical practitioners is twofold. In some instances the influences of their early environment must be overcome, in others, the mismanagement they see in the infirmary is more than an offset to their theoretical training. I believe in example even more than in precept, and feel if our infirmaries are conducted along ethical lines it will have a more lasting influence than preaching alone will effect. In our school we have found that we can more thoroughly train our students by subclass work. This is carried out in all branches of prosthetic and operative work, and no student is permitted to do any work on patients until he has satisfactorily performed similar operations in subclass. This gives opportunity for more thorough training and greater confidence than can be acquired by chair or table training alone. We have secured co-operation between lecturers and demonstrators by frequent meetings between the two forces and a full discussion as to theories and methods. I am firmly convinced, if we examine our timber more carefully *before* admission, we will practically correct, if not entirely cure most of the evils enumerated.

Dr. Frank C. Platt, San Francisco, Cal. I feel that all of us who are earnestly and honestly interested in dental education must commend the sentiments expressed in this able address, and I feel that the faults which have been enumerated are most critical and important to us today. It seemed to me that the essayist hit the nail on the head when he spoke of the better results which might be attained by demanding higher preliminary requirements rather than lengthening the course of study; also when he recommended that many students should be dismissed before finishing the course. These two items embody a great many of the faults of our present system of dental education. The fact he mentioned of insufficient fees being paid to employ able demonstrators is another fault; but how many colleges have the courage to take up the work and correct the faults to which the essayist has called attention? The dental profession is strong enough and big enough to stand for what we know is right and have the courage to put into operation. There must be a reform, and I believe even the requirements that we have today are not being lived up to by some of the so-called leading colleges. I am from a city where we come in contact with a great many students from all over the country, and many of them appeal to me for advice. Within the last two years one young man, a graduate from one of the leading colleges, came to me with such a remark as this: "Doctor, if I had knew the conditions out here I would not have came." Do you mean to tell me that in such cases as this the colleges live up to the requirements which they are supposed to demand? I have watched that man. He is a clean, honest, bright, hard-working boy, and deserves a great deal of credit for what he has done, but he will never take tke place in dentistry which he might have taken had a good education been required of him before he entered college. I am lecturing to students today who are not what they should be along educational lines. I have in mind now one student who is deficient in this respect; and if he does not do better soon, I shall advise him before the end of the session to take up something else. He is a good, honest student, but he lacks manual dexterity and artistic sense, and seems to have no inventive genius at all. Such steps as this must be taken to stop the multiplication of glittering electric signs that we see on our streets. We will need to begin at the beginning and make students what they should be at the start. If we could demand at the outset a degree in arts or letters from a university and in addition to that a diploma from a school of manual training, we would have students who would amount to something when they get out of school. My own personal idea is that too many of the colleges are influenced in accepting students by the fact that they think they must live. Most dental colleges are private corporations whose faculties are paid by the fees of the students, and there is a strong tendency to accept students if they present reasonably good certificates, and hope that they will be an honor to the profession when they get through. If each dental college could be an integral part of a university with expenses paid, as are those of the other departments, then we could afford, and would afford, to reject students who are deficient along these lines. I have asked the deans of five of the leading colleges what percentage of the students in their schools would make successful dentists, and not one of them said over thirty-five per cent. That is nothing to be proud of, and I am not proud of such a condition. I feel that these questions are important and should be carefully considered by this body, and that every college represented should have the courage to put into effect the reforms which the essayist has mentioned.

Dr. Geo. E. Hunt,
Indianapolis, Ind.

Dr. Patterson always has something to say, and when he says it we never are at a loss to know what he means. In this paper he has told us what he means in a very forcible and effective manner. But I do not agree with him absolutely in all his statements. He divided the faults which he considered into faults fostering a low grade of professionalism and faults along the line of practical instruction.

Ethics.

Under the first division he claims that the fact that students are accepted by our colleges with inferior preliminary requirements fosters the low grade of professionalism that exists in the dental profession. I doubt that. I do not believe that the preliminary education of the student has much to do with ethical practice. I think if it is in a man to be a blackguard he will be one, no matter whether he be a college graduate or not. His preliminary educational requirements will not influence him in that respect. On the contrary, if a man is going to be a blackguard in his practice, he is more likely to be a dangerous one if he has had the advantage of college education and the training that goes with it than the man who has not enjoyed those advantages. I think that those matters rest with the individual. A person possessing very inferior preliminary educational requirements may make a very fine man ethically; that is, leaving aside everything except his professional relations with his fellow man.

The Count System.

In the matter of the count system I agree with the essayist. The count system should be adopted by us. If a man gets his points legitimately, they are his; they cannot be taken away from him, and he is entitled to his time credits for them. As our rules are today, the man who comes within a week or two of graduating from the best medical college in the country is compelled to enter the freshman year in our dental schools and receive credit only for the actual work done. He does not receive any time credit for the years spent in the medical school. If he enters our institutions with the necessary information in histology, physiology, anatomy and chemistry, we may say to him that he is excused from taking these subjects. Then he says, "What will I do in the time that my fellow students, who have not had the advantages that I enjoyed, are getting this information." And we tell him to twiddle his thumbs. Under the count system we could give him the credits to which he is entitled.

Discouraging Students.

With regard to telling a student to quit the study of dentistry if he does not develop well during his first year at school: Theoretically that seems to be a reasonable proposition, but practically it sometimes would work a great hardship on the student. That statement by the essayist has been concurred in by everyone who has spoken previously, but I do not agree with it *in toto*. Our freshman students frequently come to us after having been out of student life for several years. They have lost the habits of study to some extent and these must be acquired once more. My experience during thirteen years of teaching has been that men who do not do well in their theoretical work during the first year frequently do very well in the second and third years, after having again acquired the habits of study lost from disuse. You all can recall men who did not exhibit much mechanical ability in the first few months of their college career, but who by persistence and industry acquired a considerable degree of skill. They often turn out to be better men than those who promised well during the first few months.

Of course, there are men so extremely deficient in manipulative ability and in gray matter that they should not attend school after their first year. Those men could be eliminated with advantage to themselves, to the college and to the profession.

The essayist gives the remedy for the lack of uniformity between lecturers and demonstrators. If these two gentlemen will meet and discuss matters, there will be no trouble about uniformity. Or, better still, the lecturer on operative and prosthetic dentistry ought to spend a certain amount of time in the infirmary in actual contact with the students while they are at this work.

I am not at all pessimistic about these faults being corrected. I think they will be.

Dr. S. H. Guilford, Philadelphia, Pa.

In regard to the qualifications of students: I do not know whether the laws with reference to the preliminary education are carried out faithfully in all the States, but I know that they are in Pennsylvania, and I presume they are in Missouri. We have adopted the plan of the State of Missouri, which requires that all preliminary qualifications shall be passed upon by a State official, so that under these circumstances there can be no question as to whether the student who enters the dental college possesses the proper qualifications. I do not see why all the colleges do not carry out this plan inasmuch as it was adopted by the faculties association. If the rule is not being adhered to in any State, the matter should be looked into and changed. When a student has once passed the examinations conducted by a State official, there can be no question in regard to his fitness to enter upon the study of dentistry.

Classification of Students.

In our dental colleges we have three classes of students: First, those who have had a very liberal education; they have fine minds and are good students, but are lacking somewhat in mechanical ability. The second class is composed of men who, perhaps, have superior mechanical ability or manual dexterity, but who are lacking in general education. Then we have the third class, the smallest of all, composed of those students who have had a liberal education and at the same time possess very decided mechanical ability. We meet this latter class occasionally, but not so often as we should like.

The question is, What are we to do with these men? It is very hard to take a man with a good general education but lacking in manual dexterity and turn him out, because those men sometimes develop very nicely afterwards. It is almost impossible to determine during the first two months whether a man will develop any manual dexterity.

Then there are those men who are skilful with their hands and who will make good operators, but are somewhat lacking in general education. What are we to do with them? They are men who will become excellent dentists, and although they may not be shining lights, they will serve the community well.

While it is desirable to have the best class of men enter dentistry, men who are well educated and who have the mechanical ability, we know that we cannot have all of our students in that class, nor even as many as we should like. Under these circumstances it seems to me that we ought to be a little lenient with the men who have practical ability but lack the higher education. By higher education I mean going through high school and college. These men often spell incorrectly and sometimes make lapses in their expressions. They annoy us, yet we feel sorry for them; but if they serve the community well, is not that the first essential? We are not aiming to turn out polished gentlemen, but men who will serve the public acceptably in their line of work. It seems to me that we should encourage these men in every way possible and see to it that they are turned out as good workmen as possible.

Fees.

Another point is the question of fees. Every dental college or any other institution must have the wherewithal to conduct its business. In other words, no college can be managed without money, and the income of the college must be sufficient to pay its running expenses. Of late years we have been increasing certain parts of our curriculum. We have been adding laboratories, broadening out in various ways, increasing our expenses enormously, but at the same time we have been receiving the same fees that we have had for the last twenty-five years. It would seem that the time has come for us to make a change. If we want to continue giving good service, we must have more money. This is not a commercial matter in any sense, but a question of finance. There is no reason why we should be expected to broaden and increase our facilities for the acquisition of knowledge unless we get better paid for it. This is a question that must be met.

As the essayist said, one of our greatest difficulties is to provide suitable men for teaching; not, perhaps, as professors, but as demonstrators. Any one who has been at the head of an institution for any length of time knows that it is difficult to obtain competent men to fill positions in the laboratories and in the infirmary. We must get experienced men, and they expect to be paid good salaries. In our school we may not have as good demonstrators as we should like to have, but we have the best we can get, and we have to pay them well for their services; and, more than that, we have to pay them more every year. Therefore, our expenses are increasing although our fees have not been advanced. It is not so much a question of lengthening the college courses as of extending them and making them more serviceable, and we can do that only by getting the best of help and plenty of it. The only way in which this can be done is by increasing our fees for tuition.

Dr. W. C. Reeves,
Chicago, Ill.

There are many features of the address that I heartily endorse. I do not remember that one aspect of preliminary requirements ever was brought up before, yet it is one that is of great importance, and I speak now so that others may express their opinions in this matter. There ought to be a minimum age limit. It seems to me that many students enter college too young; they are too immature to enter on their life's work. Students who enter college after having completed a high school course and after having had a few years of a business training are more settled in their ways; they know what they are doing and they appreciate more the advantages that the college offers them. When they graduate from college they will be better dentists and will be more successful men in their profession.

Dr. Edward C. Kirk, Philadelphia, Pa.

I have listened with a great deal of interest to the address of our president and also to the words that have been spoken by the several gentlemen who have participated in the discussion. On the whole I agree with all that has been said, but I want to emphasize two points so that we shall not forget them. I was interested particularly in the remarks of Dr. Platt with reference to the faulty English of one of our good schools. I have given this matter a great deal of thought recently, and I believe that the fault lies in the school preparatory system. I think they are defective in their teaching of English. It has been my experience that the men who come to us from abroad know their mother tongue more intimately than do the men of the same educational grade in this country.

Lack of Knowledge of the English Language.

I have taken up this subject with the department of public education in Pennsylvania after having observed the educational training in New York, New Jersey and the New England States. Those of you who can look back to the same period of school training to which I belong will remember that we were given a text-book on etymology, a sort of substitute for Latin. That etymology considered so much of Latin as was applicable directly to the English tongue. It did not give us a competent knowledge of Latin, but it gave us the root words and all the English words derived from those roots, so that we got a fair knowledge of the relation between Latin and English. We obtained by that method a more intimate knowledge of English than do our students of the present under the new system which has substituted a meager course in Latin for the old etymology. The students now get a year or two of systematic Latin, but it has been found by practical experience that that much Latin is insufficient to throw much light upon English; not as much as did the old-time etymology. The present method of preparatory teaching is faulty in that regard.

In the collegiate department of the University of Pennsylvania a man today passes an entrance examination the basis of which, I think you will all agree, is not easy. It is beyond the ordinary standard of high school graduation. In the chemical laboratory of the department of arts a man was given some experiments to carry out by himself. He halted in his work, and the demonstrator seeing him looking over the bottles on the rack asked him what was the matter. The student told him that he could not perform a certain experiment. The directions for experiment were about as follows: "Take mercuric oxide and some other substance; agitate and note the result." And the man looking among the bottles said that he could not find any "agitate." If that had happened in the department of dentistry it would have been taken as an evidence of the low grade of material that had been accepted.

The specimens of English that I secured from the New York, New Jersey and Pennsylvania preparatory schools were often abominable. It is heartrending to have to stand up in front of such men and see how little they know of their mother tongue. But the faults in English are not to be taken as representing a low grade of culture all around, not a lack of early training, because a student knows other things that are, in a measure, an offset to his faulty knowledge of English. We need a better training in English. Any man who does not know a foreign tongue does not know his own.

Another illustration: One of the professors was lecturing to his class in biology. He drew a distinction between the meaning of food as ingested and as applied by the cell. He gave the Latin derivation of ingesta, and then he referred to egesta, and there was not a man in the class who was able to tell him what that meant. If that man had studied etymology and knew something about prefixes he would have been able to frame his own definition of the meaning of egesta as soon as he heard the word.

Lengthening the Curriculum.

Another feature of the paper that has been alluded to is the question of broadening and lengthening the curriculum. It all hinges about the position of my colleague, Dr. Darby, who said that we made better dentists then than now. To make a dentist we must have not only the manipulative skill and ability, but we must also have a certain training in the scientific foundation of dentistry. We have added to the course chemistry, pathology, bacteriology, physiology, anatomy, etc. Do we need those or not? Is that part of the equipment of the dentist? If we do not mean that, let us all be honest and drop them from our curriculum. Let us also drop our dental degree and call ourselves master of mechanics, not doctors of dental surgery. Do we mean that those studies shall be a part of the working equipment of the professional man? Must he have them? I think he must. But in the effort to adjust these two things possibly the manipulative side has suffered. Yet, under present conditions, one or the other must suffer. If we give more attention, more time, to the manipulative side and do all we ought to do, then we are sending out men who have only a smattering of the theoretical subjects. We are giving our men about the same work in these subjects that the average college graduate gets in Latin or any foreign tongue. He may be able to read easy prose, but it is as much as he can do to order a meal; it is beyond him to converse in the foreign tongue.

Now, how many men in dentistry today are eminent for their knowledge of chemistry? I think you would stop at half a dozen. How many great pathologists have we? What has been done to settle the pathology of pyorrhœa alveolaris? This is before us all the time, and if we had more men properly trained in pathology those things would be settled; and so it is with many other things.

As to the question of professional status: Is there any other basis on which we can proceed? Is there any other thing that will give us professional status except the professional education of this craft? The profession must recognize that principle. It is not so much a question of addition of new studies as it is of better training in the old studies. If you can make a good dental practitioner in less time than it takes to make a master plumber, why do it, but I think that if we want to get professionally trained men we must do better.

Fees.

Now, as to the financial side of this question. I agree with the proposition that we should be well paid for our services. I have always been in sympathy with the position of the Widow Bedotte, who said that "The barber was worthy of his hair." In order to manage a dental college or any educational institution properly we must have money. It has been said that one way to do this is to raise the fee. I do not believe that that is the best way. There is another way, and that is to cut down the dividends accruing to the people who divide the surplus. My mind reverts to the possibility that our sympathy with this lame student who has been mentioned, the man who gives us little promise of success and much of failure, would be less if he were not worth one hundred dollars each year. If our fees were raised we would, perhaps, be still more sympathetic toward him.

There is one other matter upon which I would like to hear some expression of opinion. I am utterly unable to understand the position our president has taken with reference to one thing, that is his somewhat pessimistic view with reference to any of these reforms taking place through the Faculties Association, and his hope that they may take place through this Institute. It is strange there should be such different 'twixt tweedledum and tweedledee. If this is not the Faculties' Association, what is it? We represent the educational interests of this country, and we are the ones who must take hold of these problems and solve them for the profession.

Dr. B. J. Cigrand, Chicago, Ill.

I enjoyed this address very much and for two reasons: First, because the author dealt with the subject in a fearless manner; and, secondly, it was a criticism rather than a question of fault finding. A criticism, when properly directed, is always a benefit, and we ought to take advantage of the situation, especially because this criticism comes from our president, a man of experience, who realizes fully what is needed most and what will do good. I desire to call attention to the fact that I believe it is universal throughout all educational institutions of this country that more attention is being given to manual work. The States of Illinois, Wisconsin and Massachusetts are cutting down the theoretical work in the public schools and are giving more attention to manual training. If we will take the cue from this and cut down on the theory, incorporating this in our curriculum, we will get better results. At present we are devoting too much time to the cut-and-dried theoretical subjects, when we ought to be giving more time to the subjects that beget dexterity. We have hitched more to our courses than we can handle; and if Dr. Darby's statement made a year ago at the Chicago meeting is correct, that better dentists were made years ago than now, it is because of the fact that we had less studies then and the students were kept in closer contact with dentistry. They received better dental training. They spent most of their time in the laboratories. Today, on the other hand, very little time is given to the laboratories. I have looked into that question and I believe I am correct when I say that proportionately we are giving less time to our laboratories today than we did five or six years ago.

Preliminary Education.

As regards preliminary education: I believe we ought to have a course of probation of one year; not enter the student into the course at all, but enter him into a probationary course; and if he does not develop along the line of manual training, if he does not show that he possesses digital dexterity, tell him that he ought not to continue with the work. I have stopped a few students myself, and I have advised them to go into law or into the ministry. One man has done very well in the law, whereas he would never have made a good dentist. They do not need any digital dexterity in law, and consequently they make a success of it. In dentistry you must have mechanical ingenuity or you cannot get along.

Ralph Waldo Emerson was an excellent poet. He says he would have been a positive failure as a carpenter because he was unable to shingle a roof without splitting seven shingles out of every ten. He realized his deficiencies. That is what we must realize. When a boy cannot do with his fingers what his mind dictates, he is a failure. Old Lavater told us years ago that a man can be anything that his mind desires. But Ruskin said that mind can never do what fingers will not do. Many of us may have the desire to be pianists or harpists, yet how few could really gratify that desire or carry it out?

The Music School of Munich will take in a man prepared to come into the school, but put him on probation for one year. He is not recognized as a student in the school, but is simply a probationer. If he does not make the required progress he is not admitted as a student, no matter where he comes from. We ought to copy institutions of that kind if we are honest in our statement that we are striving to benefit humanity. Again, if you are going to put out some failures, men who do not seem to have the necessary preliminary requirements at the time, you are going to work a hardship. Where would George Washington be if you expected of the general of the army that he spell correctly twenty words? In the same letter he would spell differently the same word if it occurred twice. Therefore, I say, we must not be too severe and exact too great an education. But at the same time we should insist. first and foremost, that the student have some digital training.

Dr. Patterson. If the thoughts I had mentioned and the remedies I suggested had been attacked more I would have something to say; but as it is I can add but little to what has already been said. Dr. Hunt spoke about the educational failure, the biggest rascal of them all; and deep down in Dr. Hunt's own mind he knows, and knows full well, that so far as the majority is concerned—and it is the majority and not the individual instance that we must consider—the best dentists, the best men, the best professional gentlemen, are made out of those who have the best preliminary education.

Dr. Guilford said that we must be lenient with the men who suffered from a disadvantage in their early education or culture because sometimes they made admirable men to minister to the relief and add to the comfort of human beings in the practice of dentistry. It was right to be lenient in the days when we did not have enough dental practitioners, but today his argument will not hold good. And this argument is one that has placed the dental profession on the plane that it occupies today and against which the larger portion of my paper argued. Our present status is where we have placed it on account of that leniency; and it is not necessary to do it any longer. When it comes down to a last analysis his argument is a very poor one, and we must select the material, even if sometimes the best educated man makes the biggest rascal, else we will continue to occupy that dead indifferent level which we have occupied so long. We do not want men in our profession who will lower the status of the whole—men "who eat with their knives." We must get away from that and that is all there is about it.

I would like to say a great many things, but it would chiefly be a repetition of what I said in the address; and, in conclusion, I wish to thank you for your kindly reception of what I have said. There is nothing in the paper but what I have become convinced is true from long and close practical observation and experience. Each week as I have gone before my classes for the last twenty years, when I beg and plead for a high plane of professionalism in order that our profession may have a better standard, what do I see? An almost total indifference to the high ideals and professional duties that boys and men ought to be instructed in. They do not care about it. When we get that class of men we must drive that spirit of indifference and apathy out of them or refuse them a dental education.

The Dental Curriculum.

By George Edwin Hunt, M.D., D.D.S., Indianapolis, Ind.

When the Chairman of your Executive Committee requested me to write a paper on this subject, he informed me that the late William C. Barrett was to have been our essayist. In appearing before you as a substitute for that masterful, vigorous personality I feel that no apology is necessary beyond the simple statement that I knew him, and knew him well. Nothing but my high regard for this body and my sincere belief that your kind indulgence would cover my shortcomings with the mantle of charity, could have induced me to assume a position where comparison is so obviously to my disadvantage.

The Four Year Course.

Prior to taking up the subject matter of my paper it may be well for me to clearly define my views regarding the four year course in order that you may have my view-point. When the resolution for the four year course came up for passage, I voted "aye" in the sincere belief that it was a desirable advance calling for the support of all interested in striving for the highest educational ideals. I am frank to say that my position was taken without mature reflection and I have no excuse to offer. In the spring of 1903 the question of arrangement of a four year curriculum demanded my serious attention, and a few weeks consideration of the matter convinced me that the added year is a mistake. The intervening months have but confirmed me in that opinion. I am well aware that opposition to the four year course will meet with the condemnation of many in the profession, and I only ask those who do not indorse my conclusion to let my past record on educational legislation be the warrant for my honesty of purpose in this argument.

The all important question in considering the continuance of a four year course is naturally, do we need the extra year? To that query I unhesitatingly reply, No! If this contention cannot be sustained, the whole fabric of opposition falls to the ground. If it can be sustained, we have made an error which should be rectified.

Under the three year course, the majority of our colleges offered exclusive of holidays and examination weeks, seventy-eight weeks of actual didactic and laboratory instruction and one hundred and four weeks of infirmary work. The hours of work were not unusually long, nor was the work unusually hard. Public school pupils spend as much time each day for *nine* months in each year, at their educational tasks. No one can successfully contend that dental students were overworked. On the contrary, the brighter, more apt members of each class were capable of vastly more intellectual effort than was necessary to keep pace with the teaching. But granting, for the sake of argument, that more time was really needed to properly present some portions of the subjects taught, a month added to the session would have added twelve weeks of teaching time and a three year course of nine months would have given us one hundred and five weeks of actual teaching as compared with the same number of weeks in the four year course of seven month sessions.

Memo. seven-twelfths of 52 equals 30, plus. Minus two weeks of holidays and two weeks for mid-term and final examinations leaves 26 +. Multiplied by 3 (years) equals 78 weeks.

Seven-twelfths of 52 equals 30, plus. Minus four weeks leaves 26 +. Multiplied by 4 (years) equals 104 + weeks.

Nine-twelfths of 52 equals 39. Minus four weeks leaves 35. Multiplied by 3 (years) equals 105 weeks.

Whether more than three years, of seven months each, is needed is a debatable question and one that I do not care to entertain in this paper. For my purpose it is sufficient to show that the actual teaching time of a four year course of seven months each is barely that of a three year course of nine months each and thus dispose of the argument that more time for teaching was a factor worthy of consideration in influencing our action. It has been and will be argued that the Southern schools do not want an eight or nine month's course. The obvious answer to that lies in the fact that some of our dental schools already had nine month sessions and there is no rule prohibiting others from extending their sessions to nine months if they find seven months insufficient.

With the "time for teaching" argument settled, consideration may be given to the only other argument of which I have knowledge, namely that more time is needed for the perfection of the practical knowledge and manipulative ability of the student. In at least one school, also an earnest advocate of the four year course, none but senior students are allowed in the infirmary. As the school is a large one this course is no doubt made necessary by the limit to the clinical material presenting. But if that is true under the three year course it will be no less true under the four year course, so how will their students be benefited? Or is it anticipated that the four year course will cut down the number of students until the junior and senior classes combined are only equal to the present senior class and thus provide practical work for two classes? Very few schools have clinical material and equipment to accommodate another class as large as the present junior and senior classes, and how is the student to secure more practical instruction under the four year course if the facilities are not to be had? Equipment can be bought and infirmaries might be enlarged, but increasing the clinic one-third is likely to prove a serious problem. It would seem that this feature has already received some attention from college men for the curriculi so far arranged for the four year course, all provide for the student commencing infirmary work not earlier than the latter part of the sophomore year. This would only give some two or three months more time for practical work than is now offered.

Dentistry is a progressive science and no one desirous of attaining and retaining a position in the van ever ceases to be a student. No student perfects his practical knowledge in the college. There is a period in each man's career when he reaches the zenith of his manipulative skill and ability, but it is useless to think of keeping students in college until that time arrives, for it is the result of years of practice only. In considering the time necessary for the education of students in practical operative and prosthetic dentistry, we can only expect them to achieve a degree of skill that will enable them to perform the ordinary duties of a practitioner with credit to themselves and with benefit to their clientele. No college graduates dentists "full panoplied" like Minerva sprang from the brow of Jove. It cannot be done in twice three years. Much of any practitioner's best instruction must come from the good school of personal experience. This has always been and will always be. And if you grant this to be true, the question resolves itself into the amount of time necessary to bring the student to the degree of skill described. In my judgment twenty-four months, being two winters of seven months each, and the ten months of all day intersession practice offered by the best schools, affords ample opportunity for any student that will ever become a good workman, to acquire the skill necessary to perform all ordinary operations in a creditable manner. This has been my experience and this is my belief.

Dental Education Compared with Other Professions.

Let us suppose that in August, 1893, a young man recently graduated from college with the degree of A.B. having three thousand dollars to spend on either professional education or for investment in a business, decides on the former and begins a study of the situation. He finds on consulting catalogues and professional men, the following to be a frank statement of the facts. He can study law in the better schools of the United States for three sessions of from seven to nine months each and be admitted to practice. His degree will not reduce the time necessary for graduation. It will cost him from $50 to $100 per year for tuition and there are practically no other school expenses. In looking over the field he finds the best lawyers in his community prominent members of society. They take high rank in political and civil life. A score of specialties in practice afford opportunities for special fitness to evidence itself, with, perhaps, the judiciary as an ultimate aim. He notes that the best lawyers are liberally remunerated, their fees are large and they accumulate wealth.

Turning to the medical profession he finds his degree will admit him to the sophomore year of a four year course, the college making him this time allowance for knowledge previously acquired. It will therefore be necessary for him to attend only three years of from six to nine months at a tuition expense of from $50 to $100 per year. The other college expenses are merely nominal. When graduated he would have a choice of a dozen different specialties as a life work. Observation teaches him that the best physician in his community are prominent among their fellowmen, that they have large yearly incomes and frequently accumulate some wealth.

And then he investigates dentistry. He first discovers that dental colleges will give him no time credit for work done in other institutions and his liberal arts degree is of no value to him on that score. He will not only be required to enter the freshman class but had he come within one month's time of being graduated from the best medical school in the country, he must still enter the freshman class in a dental school and attend four sessions of not less than seven months each. His tuition will vary from $100 to $150 per year according to the school selected. His bill for instruments will be from $30 to $75 per year more. At the end of four years, if graduated and passed by his State Board, he will be permitted to practice one specialty and only one. The lawyer may elect criminal law, insurance law, real estate law, railroad law or banking law as his specialty; the physician may choose general surgery, abdominal surgery, the eye and ear, the nose and throat, obstetrics, gynœcology, the digestive tract, nervous diseases, or diseases of the genito-urinary tract as his specialty, but the dental graduate must practice dentistry. Just dentistry.* At best his field is practically "bounded by the lips in front, the pharynx behind and by the cheeks laterally." Our prospective student, in his observation of the community finds that the best dentists are seldom known outside of their clientele and their life work and the practice of their profession does not bring them prominently before the community as does that of the lawyer, and, to a lesser degree, the physician. He finds that the best of them do not attain yearly incomes corresponding to those of the leading lawyers and physicians and that few of them accumulate a competency.

What is the remedy? Either to return to a three year course of seven, eight or nine months, or adopt some laws that will permit students with previously acquired knowledge or more than average ability to complete the course in three years, if they are capable. The dental colleges have made a serious mistake and one that will affect first themselves and next the profession at large. No college man would object to small classes for the next few years if the extra time were needed and better men were presenting themselves for instruction. Better men will only come to us by raising the entrance requirements and offering inducements not offered by schools of law and medicine. This can be done without impairing the quality or quantity of the instruction given. The colleges cheerfully made the various steps in advance advocated by those interested in dental educational affairs because it was readily seen that they were needed and were for the benefit of the profession. Our present rules will work a positive detriment to the profession in turning from our doors the very men we most desire to attract. If this is true, will we have the courage to undo a mischievous piece of work or will we yield to a fear of condemnation on the part of the unthinking and continue a course sure to result in ill? I leave this to you for your consideration.

The College Curriculum.

In looking over the list of studies applicable to a dental training some will immediately suggest themselves as fundamental or foundation studies and their pursuit should be pushed in the early college life of the student. Other subjects, as operative and prosthetic dentistry, are of such vast importance and require so much detail in their presentation that the best results are obtained by teaching them throughout the entire college career of the student. Still other subjects as bacteriology, orthodontia, pathology and oral surgery, requiring a lesser time for their presentation and preliminary knowledge for their proper understanding, naturally come in the middle or latter part of student life. During the past few years this association has been favored with several reports and papers on curriculi and many of the outlined courses shown before us on large sheets of paper have been models of typography and monuments to the patience and industry of their makers, but I cannot see that uniformity among the college courses has resulted therefrom. So in this paper I will not make hard and fast rules regarding the amount of time to be spent on each subject but will take up each in turn and give my reasons for believing it ought to precede, accompany or follow other subjects.

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*Orthodontia? Prosthodontia?—ED.

Anatomy.

Anatomy should receive attention at once. Two-thirds of the total lecture room anatomy taught is most advantageously presented in the first year, leaving the remaining third for the second year. Early in the first year lectures on the various tissues should be given by the teacher having the dissecting room in charge, preliminary to work on the cadaver. In the dissecting room a convenient division of the cadaver is to call the head and neck one part; from the neck to the diaphragm two parts, one on either side of the median line; and from the diaphragm down two parts, again divided by the median line. Before the holidays each first year student should dissect one part, and after the holidays the other part, excluding the head. In the second year the head should be dissected.

Histology.

Histology should be begun at once and completed in the first year. The laboratory work should accompany the lectures. Dental histology belongs in the latter portion of the first year. It should accompany or precede lectures on the preparation of cavities. Physiology, pathology and even therapeutics depend largely on general histology for their elaboration, hence this study should be begun and finished as early as possible.

Physiology.

Physiology, another fundamental study, should be crowded during the first year. Two-thirds of that to be presented should be completed during that time, the remaining third to be presented in the second year. Pathology and therapeutics both wait on it.

Chemistry.

Chemistry also deserves early attention. The completion of elementary considerations and inorganic chemistry, including analytical work, is desirable in the first year, leaving metallurgy and organic chemistry for the second year. The laboratory should, of course, supplement the lecture room. Special chemistry relating to tooth bleaching and other subjects pertaining directly to dental art may be taught in the third year.

Operative Dentistry.

Operative dentistry should be begun at once. Lecture room work should consist of the anatomy of the oral cavity and surrounding tissues; general consideration of relations of the parts; the anatomy of the teeth; embryology, general and oral; and the histology of the teeth and closely related parts. This with a few lectures on examination of the mouth, bringing the mouth to a sanitary condition, separation of teeth and the exclusion of moisture, will consume the first year. In the latter part of the year operative technics, supplemented by lectures, may be begun. During the remaining years the course should be progressively developed from the most simple to the most complex problems presenting themselves. The lectures on this subject should be among the last as they should also be among the first delivered to the dental student. How much shall be taught in each year is a matter of opinion, and mine would probably not affect that held by some other teacher.

Prosthodontia.

Prosthetic dentistry should also have its beginning during the first year and its ending with the commencement exercises of the student. The arrangement of the course will naturally depend on the judgment of the teacher, but as a general proposition vulcanite work will come first to be followed by cheoplastics, crown and bridge work, interdental splints, et cetera, with porcelain work as the final offering.

So far this curriculum has been easy, and I have felt fairly well assured that the ice beneath me was inches thick, but from now on I realize that air holes and rough spots yawn and yearn to be my undoing.

In a four-year course, materia medica should be taught in the second and therapeutics in the third year. That proposition is easily defensible. Histology and physiology should be completed before therapeutics is taught, as a correct understanding of the latter is based on the former. Materia medica may be taught, however, during the second year, before physiology is completed. It is desirable that the student have the benefit of his therapeutical education before entering on his last year's infirmary work also. In the three-year course these studies are not so easily placed. It is just as desirable to complete them in the junior year here as it is in the four-year course and for the same reason, but we find physiology as yet uncompleted. Considering the advantages and disadvantages of both propositions, I am inclined to believe that therapeutics should be taught in the junior year of a three-year course and materia medica in the freshman year. Both might be taught in the junior year by doubling the time devoted to them, but the junior year of a three-year course is already the hardest of the three and cannot stand much additional burden.

Orthodontia.

Orthodontia is best taught in the junior year of both the three and four-year course if time will permit of it in the former. It is desirable, if feasible that the student complete this study one year before finishing his dental education that he may put his knowledge in practice. However, in the three-year course so much matter of greater practical importance in the training of the student calls for elaboration during the second year that orthodontia may be a part of the last year's course to perhaps a better advantage.

Bacteriology. Bacteriology lectures and laboratory work should come in the junior year of either course. The laboratory work in histology will have given the student the required familiarity with the microscope and a knowledge of the technic of staining and slide preparation. It is desirable that this study shall precede pathology as the latter is based largely on it.

Dental Physics. Dental physics, including strength and stability of filling materials properly comes in the sophomore year of the four-year course and the junior year of the three-year course. This in order that it may accompany the lectures on filling materials.

Comparative Anatomy. Comparative anatomy should receive attention in the sophomore year of the four-year course and the junior year of the three-year course. This is desirable in order that it may accompany or follow the closing lectures on human anatomy.

Oral Surgery. Oral surgery is a senior study in either course. It *must* be preceded by anatomy and physiology and *should* be preceded by therapeutics and bacteriology.

Medical or physical diagnosis, dental jurisprudence, oral and office hygiene, conduct of practice, and similar "finishing" studies should come in the senior year.

Pathology, lecture and laboratory is a senior study. It requires completion of anatomy, physiology, histology and bacteriology for its best elaboration. And that, I believe covers most if not all of the branches taught in our colleges.

Some years ago I had the temerity to hope that uniformity in college curriculi might be accomplished in so far as to regulate the studies taught in each year, not the amount of time devoted to them, but as the years roll on the conviction is forced in upon me that such a hope is but an iridescent dream. However, to fulfil the obvious wishes of the executive committee a list of studies to be given in the three-year and four-year course is herewith appended:

Three Year Course. First or Freshman Year—Physiology, anatomy, histology, chemistry, materia medica, operative dentistry, prosthetic dentistry, chemical laboratory, histological laboratory, operative and prosthetic technics and dissecting.

Second or Junior Year—Physiology, anatomy, comparative anatomy, chemistry, therapeutics, operative dentistry, prosthetic dentistry, bacteriology, dental physics, chemical laboratory, bacteriological laboratory, operative and prosthetic technics, infirmary practice and dissecting.

Third or Senior Year—Operative dentistry, prosthetic dentistry, orthodontia, medical diagnosis, dental history, oral hygiene, dental jurisprudence, oral surgery, pathological laboratory, porcelain technics and infirmary work.

Four Year Course.

First or Freshman Year—Physiology, anatomy, histology, chemistry, operative dentistry, prosthetic dentistry, chemical laboratory, histological laboratory, operative and prosthetic technics and dissecting.

Second or Sophomore Year—Physiology, anatomy, comparative anatomy, chemistry, operative dentistry, prosthetic dentistry, dental physics, materia medica, operative and prosthetic technic, metallurgical laboratory, chemical laboratory, dissecting and infirmary work during the last half.

Third or Junior Year—Operative dentistry, prosthetic dentistry, therapeutics, orthodontia, bacteriology, operative and prosthetic technics, bacteriological laboratory and infirmary work.

Senior or Fourth Year—Operative dentistry, prosthetic dentistry, oral surgery, pathology, medical diagnosis, dental history, oral hygiene, dental jurisprudence, pathological laboratory and infirmary work.

Discussion.

Dr. J. B. Willmott, Toronto, Can.

When I entered upon this work I canvassed this subject from much the same standpoint as Dr. Black. I represent a school that went into the four-year course in good faith. We rearranged the entire course with a view to adapting it to a four-year course so that our freshman course this year differs materially from the previous course in the same year.

When I sat down to prepare this paper, the question arose, "was I to discuss the paper of Dr. Hunt, or the subject, or both?" A little consideration decided for "both." A glance at the programme provided by the executive committee admonished me that my contribution must be brief.

The Dental Curriculum.

The subject, "the dental curriculum," is, to those associated with dental schools, as well as to students, present and prospective, a very important one. It may well be considered under three heads; "the various branches of study to be included," the "time to be given to their mastery as a whole," and "their assignment to the several years of the course." Dr. Hunt discusses first, the second of these divisions, namely, "the length of the course." So far as this institute is concerned, being made up of representatives from colleges in membership in the National Association of Dental Faculties, this is presumably settled as one of four sessions of seven months each. The essayist seeks to reopen the question and argues strongly against a course extending over more than three years. The argument is summed up in the conclusion, that a young man of fair education, not being a "fool" or an "ass" will not study dentistry under a four session course, the reason assigned being that the emoluments and other advantages offered by law and medicine are much more attractive. I think he is decidedly astray in his presentation of the financial argument. My observation, in my own country, is that no class of professional men, entering upon the active duties of their profession, so soon establish a paying practice, and are in a position to marry and form homes and domestic circles for themselves, as the well equipped graduates in dentistry. I venture the opinion, based also on observation, that excluding, say, five per cent of physicians and surgeons and lawyers, who in their wider field command extraordinary fees, which are seldom open to the dentist, the average income of the dentist will exceed that of either of those named. In these United States there are probably one hundred physicians and as many lawyers, who abandon their profession, failing to secure financial success, where there are ten dentists who pursue a similar course for the same reason. These considerations do not show that the young men who study dentistry are necessarily deficient in their "sanity" or "sense." So long as a fair proportion of dentists are undoubtedly earning good incomes, the pecuniary aspect will not deter suitable men from entering the profession. So far as social position is concerned, every man who is not born to a "social position" must make it, if he ever has it. In making it, in this democratic country, character and culture are much more important factors than his calling, professional or otherwise. The essayist seems to have overlooked another very important factor in the consideration which determine a young man's choice of a calling in life. Men vary greatly in their tastes, ambitions and general mental make up. The type of mental endowment, which would be attracted to pedagogy, law or medicine, would look upon the practice of dentistry as unendurable drudgery. On the other hand, the type that takes intuitively to buying and selling, trading and speculating, would abhor any kind of professional life. The type of man that would be attracted to the profession of dentistry is characterized by the mechanical and constructive instinct associated with the artistic taste. In choosing a calling, such a man would decide between dentistry, engineering, architecture, manufacturing, and similar occupations. These considerations, much more than the length of the course, will be the determining factors in the choice of a calling. My deliberate judgment is that the raising of the standard by requiring a better preliminary education and by lengthening and widening the course, will bring into the profession a class of students coming from a higher social grade and with decidedly truer professional instincts and ambitions. The numbers will, at first, be lessened, but the quality will be improved. The only danger, if danger there be, will be the possibility, that by the largely increased expense of entering the profession, we may shut out a class of young men, whose ancestors, through many generations, have been engaged in mechanical pursuits, until the constructive instinct and ability have become a positive inheritance. There is no doubt that this class of young men, when possessed of the necessary mental alertness, make the very best and most successful operators.

So far we have considered only those conditions which operate to attract or to hinder young men who are contemplating the study of dentistry. This is not, however, the whole case. What is a reasonable time in which to undertake to make an efficient dentist out of the average student? Dr. Hunt says, that relatively to law and medicine, three sessions are sufficient. Dr. Junkerman says that under any circumstances, three sessions are better than four. Let us inquire into this matter. What is required of the competent dentist? Saying nothing for the present of the scientific knowledge, which is essential to his success, he is required, as an operator, to be able, under very inconvenient, and in many cases very difficult, conditions to make a mechanical operation, which to be useful must be practically perfect, and which requires for its accomplishment as fine and accurate manipulation, and as perfect correlation of the brain, eye and hand, as any work in the whole range of mechanical pursuits. How long a time will be required, on the average, for the student to acquire this manipulative skill? What do we learn by inquiries concerning apprenticeship in mechanical callings, which do not require greater manipulative ability? For example, engraving, lithographing, gem-setting, watchmaking, or of the coarser trades, plumbing, gas-fitting, brass finishing, etc. I understand that three years is considered the shortest time in any of these occupations, in which the tyro may become a "journeyman" and entitled to "union wages." Not three years of seven months each, but thirty-six months of continuous application. The weak point in the American dental curriculum, so far as the development of manipulative skill is concerned, is its intermittent character. A man would be considered far from wise, if he undertook to make an expert engraver by starting a student with eye glass and tool to gradually acquire accuracy of touch and perfect obedience of muscle to will, and then, at the end of seven months, when he was making perceptible progress, take him from his bench, and for five months, with pick axe and shovel, set him to making roads. At the end of the period bring him back to his bench, with eye glass and tool for another seven months, and for three or even four years go through the same absurd procedure. At the end, what kind of an engraver would he be? This is precisely the way in which the accepted curriculum proposes to develop the manipulative skill of the student of dentistry. It is very doubtful if ten per cent of dental students give any attention to either theoretical or practical dentistry during the interval of college sessions.

Continuity of Study.

Should sessions be longer than seven months? No. If students apply themselves closely to the scientific studies presented and fill up the time with manipulation, the session is long enough to weary, and in many cases to exhaust them. He should, however, keep up his manual training during the entire year, and his attention should not be distracted by other pursuits, if the highest success is to be obtained. But you say the student of law or medicine takes recess of four or five months. True, but their work is purely mental, while that of the dentist is both mental and manual. What of the embryo engineer or architect? His course is continuous, so should be that of the dental student, either in school, office or laboratory. If this intermittent and broken course is to be continued, then I wish to be understood as contending strongly for a four session course of not less than seven months each.

As to what should be included in a dental curriculum, there will not be much difference of opinion, and time does not permit me to discuss it.

As to the assignment of the various subjects of study to the several years, there is likely to be a great variety of opinion, based largely on the varying conditions of different schools in relation to the other faculties in the same institution. In my judgment, our dental curricula are not as logically constructed as they might be. Our purpose is, or ought to be, to educate dentists to successfully treat the pathological conditions of the teeth and surrounding tissues. This requires, in addition to everything else, and may we not say, above everything else, manipulative skill. Skill requires time for its development. We should commence to develop this skill in the first year, and continue it through each successive year. The first year should not be given over wholly, or even principally, to medical and scientific studies. The *work* should be technic, and time filled in with didactic teaching in other subjects. Every subject cannot be taken in the first or even the second year, however desirable it might be. Basic subjects should be taken, first, then those which depend upon them naturally follow. Physics should precede chemistry. Histology should precede physiology. Materia medica and bacteriology should precede therapeutics and pathology. Theory, as a rule, should precede practice. The work should be divided evenly over the four years. In this connection, I want to say that patients in our infirmaries have some rights. They should not be made the victims of crass ignorance on the part of students. Before being admitted to the infirmary the student should have attended lectures or operative dentistry, prosthetic dentistry, pathology, and therapeutics. This he may do in his second year, and be permitted to work in the infirmary the whole of his third and fourth session, reviewing his didactic teaching in dentistry at the same time.

The writer has been occupying the position of dean for twenty-seven years and has given some consideration to the dental curriculum. As a result of experience, observation and conference, he ventures to submit the following as being complete as to matter, fairly even as to distribution, and reasonably correct as to sequence.

Curriculum for a Four-Year Course.

First Year—Lectures: Histology, bacteriology, comparative dental anatomy, metallurgy, physics, materia medica, operative and prosthetic technic, commence anatomy. Laboratories: Histology, operative and prosthetic technic.

Second Year—Lectures: Therapeutics, orthodontia, crown and bridge work, complete anatomy, commence dental pathology, operative and prosthetic dentistry and chemistry. Laboratories: Practical anatomy, operative and prosthetic technic, crown and bridge work technic, orthodontia technic.

Third Year—Lectures: Electro-therapeutics, complete operative and prosthetic dentistry and dental pathology and chemistry, commence physiology, medicine, surgery and general pathology. Laboratories: Infirmary, operative, prosthetic, orthodontia, crown and bridge work, chemistry, bacteriology, pathology, porcelain technic.

Fourth Year—Lectures: Jurisprudence, physical diagnosis and anesthesia, complete medicine, surgery and physiology, history of dentistry, ethics, hygiene and prophylaxis. Laboratories: Infirmary, operative, prosthetic, orthodontia, crown and bridge work, porcelain work, chemical metallurgy, clinical medicine and surgery at the General Hospital.

Dr. G. V. Black, Chicago.

Dr. Hunt has given us a very frank expression of his views in regard to the four-year course, and also a very good resume of the curriculum for the three-year and four-year courses. Perhaps, I might as well say a word in regard to the curriculum.

The Four-Year Course.

I have not troubled myself much as to the curriculum of the four-year course, believing that until that course is developed further in practice, it is not necessary for us to worry our minds as to how the studies should be arranged in that course. I have started my freshman class on the same course of studies precisely that I followed in the three-year course, and I expect to continue them in the same way in the second year, allowing the new curriculum to develop itself as the four-year course is developed. There is a very good reason for that, about which I have spoken to you before. Immediately after the four-year course was adopted a resolution was offered that would shut off from return, under the conditions of the three-year course, all those who were out for more than one year, which in due time became a law of the Faculties Association. This will give us students for the first year of the four-year course that we must graduate in three years' time. And for these it is well to keep open the three-year course. It is well to keep in the line of the three-year course for the first three years of the four-year course, and after that we will have plenty of time to give them in the fourth year, such work as they may require. Then, too, we can shape our four-years' course so as to meet the demands.

This was my idea from the beginning and was my idea when I opposed the resolution of shutting off men from the three-year course who shall have been out for more than one year, so that we would not have these men mixed up with the four-year course afterward. I do not expect that the schools of this association will become entirely harmonious at once as to their curricula. It will require considerable time to do that; but I think the development in that line is satisfactory; perhaps, I have more to do with this than any man in the association, for the reason that I have such a large number of students coming to me from other schools. The difficulties in classifying these men are very great, and will be for some time to come. I have had to go over this work of classification for nearly seventy students this year who have come to us from other schools; and in this work I get to see the difficulties existing in the curricula of many schools, as we do not see it in any other piece of work we have to do.

As to the curriculum: I would make some things different. I want two years in histology, even in the three-year course, and in some of the other studies I would arrange the time differently. But we will come together on this in time.

Now as to the desirability of the four-year course, basing it purely on the question of desirability: We will argue it from that standpoint alone, or from the position taken by the Faculties Association, and our indisposition to go back on that which we have done. I know the history of progress in dentistry pretty well. I have been careful to tabulate the progress from the one-year course of four months, followed by graduation, to the two-year course of four and five months, followed by graduation. In the two-year course some schools gave six and seven months, and others gave only five. Then the progress to the three-year course, and now the progress to the four-year course. We had the same difficulties in passing from the two to the three-year course. I remember that one man at that time told me that he did not know how to dispose of the time. I expressed my regret at that, because I did not know how to do enough work for the students in three years.

At the beginning of the three-year course the freshman class in most schools was very small. Apparently many students hesitated to go in on the three-year course, and many schools were discouraged on account of the small freshman classes, and many would have been glad then to go back to the two-year plan. But it was only a short time before the schools had as many students as they ever had before (not more than three years), and in five years from the time we went from the two-year course to the three-year course the aggregate of graduates in the schools of the country was as high as at any time during the two-year course, and one-third more tuition was being paid into our schools than during the same period of time in the two-year course, which amply repaid the schools for the additional teaching work they are doing.

This is what statistics show as to the progress made, and the same will be true in the change from the three to the four-year course. It will take us a little longer, but not much. The development of the schools is not quite so rapid now, as when we went from the two-year to the three-year course. That was the time of boom in dental school work; that has slacked somewhat at present, and the number of dental students are not increasing as rapidly. But within four years, at least, we may expect that we will have as many students as we had at our last session of three years; barring the extra number of students that rushed in to obtain the three-year course. In a few years after that we will be graduating as many dentists as we are to-day. Therefore, from a financial standpoint we have no reason to fear the four-year course.

Is Dentistry Progressing?

Now, from another standpoint: While the essayist has given you an elaborate description of the student seeking a profession, yet his references to dentistry have been such as I do not like to hear before this association. I do not care to mention these references specifically, but I take an entirely different view of the matter. I have taken some pains to study this problem. I thought it my duty to my university to do so. They have asked me about this; what would be the result; what is dentistry doing; what is its future; why should four years' time be required? And for this reason I have given this matter considerable thought. I have looked about me as to what dentists are doing; whether they are leaving their profession and taking up other pursuits. As to whether lawyers and doctors were doing likewise; and I made some comparisons on that point. The results are very favorable to dentistry, and I do not believe that the *ears of the dentists are lengthening today*, nor will they in the future. I have gone to the houses dispensing materials to dentists, and I have asked them about their clerical force ten years ago and now. I have asked about their sales ten years ago and now. I inquired not only as to the differences in dollars and cents, but also as to the difference in the quality of material used. One house showed me their books of twelve years ago. I do not believe that this house is getting a greater share of the business proportionately today than they did then; in fact, I believe that they are not getting as great a share of the business now as they did then. Twelve years ago they had twelve men in their employ as clerks, dispensing their goods. Last fall they had sixty-three. As to the quality of the goods used—they told me that a large share of the increasing business had been in the more expensive goods; those used by the better class of dentists.

Furthermore, the traveling salesmen with whom I talked said that in the little towns throughout the country, where, ten years ago, there were no dentists, because they could not make a living, there are dentists today, and these men are buying goods, and they are paying their bills. What does this mean, gentlemen? Simply this: Dentistry is developing more rapidly today, and the use of dentistry, the employment of dentists by the people, is greater now than it ever was before. The people are becoming more critical. They are demanding better dentists; they are requiring more of their dentists; they are looking more carefully and knowingly into the quality of dental work than ever. Therefore, the dental houses find a better class of dental goods in demand. Why is this true? Because we are sending out a better class of dentists now than ever before. They are serving their clientele better, and the people are making greater use of the dentist now than then. That is the reason, too, why these houses are selling more and better dental goods. The demand for the service of the dentist has doubled within less than ten years, and it will double again within the next ten years, if we send out men who are capable and honest in serving them.

Is Dentistry an Attractive Field of Labor?

Gentlemen, these are facts that cannot be gainsaid. Any one of you will find this to be true. The demand among our people is for educated men; better men than we can properly prepare in the three years of time of the material we must take into our dental schools at the present time. The demand is for a higher class of men; men who can and will do honorable work; men who are capable of giving excellent service. I grant that there are men who pass through our schools in a perfunctory way who do not practice afterward; or practice, and then fall out; but the proportion is not so large as in either law or medicine. Today the large majority of men who graduate from our schools go out and practice dentistry successfully. This cannot be said of either law or medicine, especially the former, because the majority of men who graduate in law do not make successful practitioners. A larger proportion of those who go out to practice medicine fail than is true of the dentists. I grant that some lawyers make more money than some dentists. Dentistry is not a profession in which men pile up money very rapidly, but it is a profession in which a larger proportion of men make a good and honest living than is the case with the graduates in any other profession.

Now, is a man a fool who makes a choice of that which gives him more certainty of a good honest living, rather than to choose that which has in it the prospect of making a fortune, or nothing at all? I think not. A greater proportion of men succeed in earning a good fair living in dentistry than they do in the mercantile business. In fact, I do not know of any business today to which I can point and say that it is safer for the young man than dentistry; that is, a man who comes with educational requirements that seem to be necessary to him to enter dentistry.

The Four-Year Course.

As to lengthening the course: If I had had just my way about it, I would have said, "Let us go to the high school graduation first, and to the four-year course later." I would rather have had our students have those other two years in the secondary schools than the one additional year in the dental school. But I gave way to the majority, understanding its meaning as I understand it now. I am not disappointed in the result thus far. I have no reason for wishing to recall my vote. I am not convinced that I was wrong or that the profession was wrong.

Only one year after we went to the three-year course the proposition to go to the four-year course was made, but few were in favor of it. And every year since, but one, it has been before the Faculties Association, every year receiving more votes, and growing in favor, until the year at which it passed it seemed inevitable, and nearly every one voted for it. Every man had the opportunity to study this matter, and study it carefully, and I feel, gentlemen, that it would be a shame, after having studied it for ten years, then passing it and giving an extra year, before putting it into effect, that we should go back upon our action. It seems to me that the educational world will say that the dental profession should be ashamed to go back upon that vote. My advice is to stand fast to that which we have done. Show to the world that we are in earnest; that we mean what we say; that we are doing this for the better education of dentists. We are doing this so that our men may go out strong men; that when the people employ our graduates they will not be disappointed in the result. Let us put our shoulders to the work with a determination to do it well; to send out young men as well fitted as it is possible to make them; and then the people will applaud our action.

Advance Standing for Academic Degrees.

Now as to the plea that no recognition is made in dentistry of the man who has a B. S. or A. B. degree. A resolution is now before the Faculties Association allowing the schools to advance men having such a degree, if they do their work sufficiently well, so as to enable them to graduate in three years; and judging from the discussion of it, I have no doubt as to the result. There are many things in our rules that are arbitrary and unjust. They were the best at the time of their passage, but they are not so now; they will be changed gradually. There is also a resolution before the Faculties Association for the recognition of the work done in other than dental schools. There has been an arbitrary injustice in the rule that none but graduates of medical schools should have any credit on time. That was an unjust ruling, and we have the machinery in motion to wipe that out and make more just rules.

As to the rule in regard to medical schools: We have made the rule that none but graduates shall be allowed time, when, as a matter of fact, the studies upon which they are allowed time come in the freshman and sophomore years entirely, and not in the other years. It worked an injustice. We will give these men credit for work done in other schools and will allow them the time required to do this work up to a certain extent, but we must recognize that the purely dental curriculum must require a certain length of time, no matter what advantages the man has had in the way of other education. From two and a half to three years are required for this part of the work, and it must be met, no matter what the education of the man may be.

But we have not had any difficulty with that in the past, and there will be none in the future. It requires time to bring all these matters into shape, and it will be done as the years pass by. As to standing fast—there are some of us who feel discouraged because our freshman classes are very limited this year. But, gentlemen, hold on. If you can do your work well you have no reason to fear.

Dr. E. H. Long, Buffalo, N. Y.

There is one feature in the address and the discussion that appeals to me. I am sometimes consulted by young men as to which they shall take up, medicine or dentistry, and being somewhat conversant with the work in both, I feel that I have been able to direct them along lines of fact, and usually place the matter in about this way:

Dentistry is a growing field, and Dr. Black has very well set forth his belief that during the last ten years the demand for the services of the dentist has doubled. I think we need only to add that the field of dentistry is limited only by the degree of education of the people concerning the value of the preservation of their teeth. Contrasted with that, the field of medicine is restricted, and it is becoming more and more restricted, because there are less diseases to treat. You will at once appreciate this when I refer to what would have occurred twenty years ago in case of scarlet fever occurring in a family of ten. At that time all the children in the family would have taken the disease; today only the one child need have the disease, because it is isolated promptly. The statistics of New York show that the death rate from tuberculosis has diminished forty per cent. All this means that many diseases are being prevented and that the field of the physician is being restricted.

In regard to the expense: I tell these young men that it costs more to acquire a medical education than a dental education, which is a fact. The essayist was in error when he stated that the fees in medical colleges range from fifty to a hundred dollars per year. The cost of equipment of a first-class medical college today is so great that the fees must necessarily be higher than those of the dental college. Most of the better class of medical colleges have fees above one hundred dollars, not including laboratory courses and other incidentals. Some medical colleges have fees as high as two hundred dollars a year. And with this the medical student has no opportunity of securing a position as assistant, that will lighten the burden of fees somewhat. I think that the comparison is in favor of dentistry.

**Dr.
A. G. Friedrichs,
New Orleans, La.**

It may be temerity on my part to express an opinion on account of the fact that my period of service does not extend over many months. Most of my teaching experience has been gained in the faculty of a post-graduate school of medicine. I accepted the four-year course and am preparing my students on that plan now. I think that it would be a sheer piece of cowardice to acknowledge that we are in a position where we cannot maintain the four-year course. That other professions offer special advantages is not true, and even in medicine, if you wish to engage in one of the specialties a further preparation of at least two or three years is required. No man living who has just graduated from a medical college would attempt to perform an operation on the eye without having had special training in that line of work. Neither would a recent graduate in medicine think of performing a laparotomy, unless he could not do otherwise because of force of circumstances. Such operations are performed only after having had years of experience. He must take further education in these special lines of work.

The fact of the matter is that the profession of dentistry was never arranged properly so as to be taught correctly. The whole plan of instruction is out of joint, and if I had my way, I would not admit a single man to my school who did not have a medical degree. Then we could make our course one or two years, and teach only the dental specialty. The degree of D. D. S. does not convey all it should; it does not give you the recognition it should. I am an M. D. and I have every privilege that you possess. I have had every honor in dentistry that could be bestowed on a dentist; there is nothing that has not been mine in the way of either dental or medical honors, so that I have no ax to grind. But, we must not acknowledge that the standard has been put too high for us to follow.

**Dr. F. C. Platt,
San Francisco,
Cal.**

There seems to be a general impression that if this association recedes from a four-year course it is taking a backward step, of which it should be ashamed. Any man who makes an error and then corrects it has no need to be ashamed of that action. Therefore, if we have made an error in extending our course to four years, and then recede from it, we have nothing to be ashamed of; we simply acknowledge having made a mistake, and do all we can to remedy it.

I have yet to hear a sound argument to prove that the four-year course of seven months is better than a three-year course of nine months. If the colleges which now have a seven-months' course will adopt a three-year course of nine months each they will be giving their students twenty-seven months of work in three years, as compared with twenty-eight months in four years. They will be giving only one month less of tuition. In the four-year course there are fifteen months of idleness, whereas, in the three-year course of nine months there are only six months of idleness, during which time little attention is paid to dentistry. It is a well known fact that if a student has once acquired the habit of study and then breaks it a part of the following term must be spent in reacquiring it. The present course does not tire any student who attends to business while he is in school. Every dentist in active practice works ten or twelve months in the year and often many years elapse before he feels that he can afford to take a vacation.

I believe firmly that there is no retrogression if a three-years course of nine months is adopted. To go back to a three-year course of seven months would be retrogression, but there is a decided advantage in the three-year course of nine months, and I am convinced that we can make as finished a dentist, so far as any school can make him, in that time as in four years of seven months each. The only argument I have heard is that some students must have five months during the year in which to earn enough money to go on with their studies. But that is rank nonsense. If a student leaves the college for five months and does something else during that time he is losing the habit of study which has been instilled into him. If a student must work his way through school, he would better commence his studies one year later and work a year longer before entering, so he will have enough money to carry him through college without having to return to his previous occupation.

We cannot improve the standing of dentistry by adding to the length of the term unless at the same time we improve the material we have to work upon. If we are going to have dentists what they should be, let us be careful about the material that we take into our colleges. Increase the preliminary requirements; get students who already have their education; get students who have been taught habits of industry and who want vacations only long enough to give a helpful rest.

If we are going to make the four-year course one of nine months in each year, very well; that would be a decided gain, but this is not true of the four-year course of seven months.

Beneath all this lies the question of fees, upon which all our colleges are more or less dependent, but I do not like the undercurrent running through all our meetings, leading to the belief that the fee is the main thing. Until the question of fees is subordinated to the fact that we must turn out a good and finished product, we are not doing our best. Many of our teachers are not receiving good fees; many of them are losing money by teaching, because they are losing valuable time at the office; but they continue to teach because they feel they are aiding the profession, and are doing their duty not only to the profession but to the public as well.

Dr.
R. H. Hofheinz,
Rochester, N. Y.

If I had my way, I would demand four years of nine months. The question of vacation has been forcibly impressed upon me by the remarks of Drs. Platt, Hunt and Willmott, and, although I came here to advocate strongly the four-year course of seven months, I am now in doubt, after listening to the arguments of these gentlemen, whether that course is the best thing for our schools. We all know what a long vacation in our own practice means. What does it mean to the student who is away from dentistry for five months, and who, during that five months, does not apply himself? Of course, there are many who are obliged to earn sufficient money for their next course. These men will apply themselves, but that class is always in the minority.

The law of supply and demand applies to scientific work, as it does to business. When our three-year course was established we did not have the amount of work to do that we have today. Look at our didactic teaching! Look at our bacteriology. Where was it ten years ago? Take crown and bridge work; take porcelain work; we must have additional time. But I do not at all agree with Dr. Fredrichs, who advises to take medical students and claims that in two years we can make first-class dentists of them. I do not believe that. I remember a number of instances, and particularly a graduate from a European university. It took that man two years to learn the difference between a square and a round hole.

I plead not only for the additional time, but also for specific preliminary education, and it is for that very reason, as Dr. Hunt correctly stated, that so many of our dental students later on change their vocation. They are unfit to practice their profession, and that unfitness should, to a degree at least, be found out before they enter college, and not afterwards.

Dr. W. F. Litch,
Philadelphia,
Pa.

When in the National Association of Dental Faculties the proposition to extend the course from three years to four years came up for a final vote, I had instructions from the Pennsylvania College of Dental Surgery to vote for a three-year course of eight months rather than a four-year course of seven months. That was the preference of our school then, and it is the opinion of our faculty now that properly utilized that time will meet present requirements. We fully recognize the necessity for the extension of the course. Dr. Black has told us that the Faculties Association was ten years in developing the four-year course, and yet when the advance is finally consummated, and two years afterward, he is unable to tell us what he is going to do with that fourth year. The Pennsylvania College of Dental Surgery attempted to formulate a four-year course, and finally concluded to do what Dr. Black has done, to continue the present instruction, with the addition of one or two subjects for study, and devote the fourth year mainly to practical operations and prosthetic work.

An extension of the courses to eight or nine months would be advantageous to our school, because our clinics are most largely attended in April, May and June. If we kept our students at work during these months they would have an abundance of clinical material and would be better fitted for their life work. That is the way we look at it from the practical standpoint.

Dr. Black has said very judiciously and justly that dentistry commands the confidence of the people. That there has been an enormous increase in the amount of dental practice. And that there has been an increase in the proficiency of dental service. All that is true; yet all that advance and increase and progress has been the result of the labors of men who had a training of only two or three years. I came here with an open mind, and I am not ready to vote for an entire reversal of the action of the Faculties Association. But I want to know what we are to do with the fourth year. It is not merely the calendar by which we are to judge of progress, but by work that is done in a given time, and I am convinced that we can do all the work really needed in three years of eight or nine months that can be done in four years of seven months. Education was made for man, and not man for education, and if we can train men properly in three years of eight or nine months, there is no justification for sacrificing one year of their lives in college attendance, which, however advantageous it might be, is at present not absolutely necessary to the making of a good dentist out of a good student, and certainly will not make a good dentist out of a bad student.

Dr. D. M. Gallie, Chicago, Ill.

It seems to me that all here agree that an extension of time is necessary, but the question now is whether that extension should be to three years of nine months each, or four years of seven months each. And we all agree that another step in advance would be the increase in preliminary requirements of students coming to our dental colleges.

Some advocate a B. S. or A. B. degree, claiming that the holder of such degree should be allowed some time. I believe that that would cause much trouble, because the average young man who comes with an A. B. degree has the advantage over the young man who is only a graduate of a high school. The high school is the highest government school we have, and a graduate from that school, I think, should be entitled to enter our dental colleges or any other professional school. When you go beyond that, there are schools for those who possess advantages that the average young man does not have. When a man graduates from a high school he should be allowed to enter our colleges and be given all the privileges that are extended to the man with a degre.

Furthermore, I can mention schools, East and West, where a B. S. degree can be obtained in three weeks, and in some places the degree can be obtained for $50, without any attendance at all. But few high schools graduate students unless they are fit. We should exact a high school diploma of our matriculants, and I believe in time we will come to it; when we do we will have material that we can teach as much as is necessary in three years of nine months.

In my limited experience in the infirmary I have found that the student who is fortunate enough to be able to stay through the summer and work in the infirmary is far ahead of his less fortunate classmates. From what I have seen I am led to believe that if the colleges adopt the three years of nine months many students will be in such position that they will be able to go the first year of nine months; then take a vacation of three months. And for the next two years they will continue through the whole course of twelve months, putting in their time during the regular college course and working in the infirmary for three months. If they will do that, they will be far better dentists at the end of the three years than the student who attends seven months for four years, with a vacation of five months each year.

As Dr. Willmott and Dr. Platt have said, a young man out five months loses his cunning and the habits of study so that he comes back to school handicapped. I believe that the course is all upside down. The young man coming from the workshop is not on the same plane with the student who is a high school graduate. His mind is not in the same receptive state with regard to the scientific studies. You cannot teach him bacteriology, physiology, histology, etc., with the same degree of understanding. We should start such men in on lines which they can understand. Teach them finger craft. Schools should have all the material and equipment necessary to develop handicraft, and then during three years of nine months you will have plenty of time for the teaching of anatomy, physiology, bacteriology, etc.

Dr. F. B. Noyes, Chicago, Ill.

The highest school is the highest public school, but the State university also is a State institution. Dr. Gallie pleaded first that the graduate of the high school was prepared to continue scientific study, and then he continued to argue in favor of a man having manual training first. A few things occur to me just now that are in favor of the four-year course. One of the greatest difficulties in the dental curriculum so far has been the number of subjects which a student is required to carry at one time. Increasing the length of the three years does not help us out in that respect, whereas the four-year course would. Every teacher knows that it is not desirable for students to carry too many studies at one time, especially when we must teach finger training through the entire course. We must distribute the other work evenly, and that could be done to good advantage in a four-year course, but not in a three-year course. I would be in favor of increasing the number of months per term in the four-year course, but climatic conditions in certain parts of this country would render that impossible.

What is it that has created the demand for the four-year course? It is the increase in the number of subjects with which a man must be familiar, and also a development in the old subjects. For instance, a number of years ago, one course in histology was enough. Today we cannot get along with less than two courses; one a general course, and the other a course applied to dentistry alone, and which cannot be taken until the general work has been completed. In physics we should have a preparatory course and then a special course of applied physics for dentists. The development of porcelain work, of applied electricity in dentistry, of oral surgery, and other special subjects applied to dentistry has made the demand for the increased time, and I would be willing at any time to stand in the face of any one who says they did not know what to do with that fourth year. The question is what to leave out of the fourth year, because we cannot provide the means of teaching it.

It is not the recognition of the B. S. or A. B. degree that is called for, but a recognition of the work that the degree represents. A degree that does not cover the work of the dental school should not and would not receive any credit. For instance, in my own department of histology, I cannot require a man who comes to us from Johns Hopkins University with a credit in histology to take the work over again under me. But a man coming from some schools of this country may have the same degree as the Johns Hopkins man, but he may not have had the same amount of work, and he would have to take the work in our school again. So that it is only a recognition of the work which the degree represents that is called for.

Dr. S. H. Guilford, Philadelphia, Pa.

All of us present are teachers, and we are all actuated by one desire, which is to improve the quality of the product which we turn out from our colleges. We all agree on one thing, that the dental course as now constituted is not long enough to answer our purpose. So that it resolves itself into a question of whether we shall have a four-year course of seven months, or a three-year course of nine months. That question will, I think, have to be decided by certain things, the principal of which is this: Can we do more for the student in three courses of nine months than we can in four years of seven months? If we can do more in four years, then it is the course to adopt; if in three years, then by all means let us adopt that.

I have been a teacher for twenty-two years, have taken a great interest in everything connected with dental school work, and I have found certain conditions which, I believe, all of you find. Whenever we open our school for a new course of lectures, the students have been more or less unsettled by their vacations, and it takes nearly a month before we can get them down to good solid work. They attend the lectures and perform their tasks, but they do not enter into the real spirit of their work. After the students once get settled it is much easier for them to do the work of the last five or six or seven months than the work of the first two months. For that reason it seems to me that if we could lengthen our course to nine months, and have three years of it, it would be an advantage to the student; much more so than to have four years of seven months each.

If we give a student five months of vacation, he falls out of the line of study and manipulation entirely. The laws of the State or the ruling of the State Boards of Examiners will not permit them to do certain kinds of work during their tutelage, hence, much of the work done at college is lost sight of. If they could practice, the loss would not be so great. Therefore, I believe by carrying them along for nine months the students would be the gainers.

There is another feature, and that is the getting of good demonstrators. We can get better demonstrators if we contract with them for nine months than for six or seven months. Some men would like to make it a life business, but they do not like to be connected with a school for six months and practice six months; nor can they afford to be idle for five or six months. Therefore, I believe, taking all things together, that our students will be able to do better work, and we do ourselves more credit by having a three-years' course of nine months than one of four years of seven months.

Dr. H. B. Tileston, Louisville, Ky.

It seems to me that the paper as well as the discussion has digressed somewhat from the subject announced in our program. It seems to be recognized fully that we have no spare time for teaching dentistry in three years of seven months each. We have from time to time added subjects to our curriculum, loading it down, until now we are teaching almost everything in the course of dentistry. Why not take students without any limited time at all, and then apply Dr. Hunt's count system? Take in any kind of material and keep it until it is finished, and when finished, turn it out, no matter how long it takes.

Dr. G. S. Shattuck, Detroit, Mich.

Three years ago we adopted the four-year course of nine months and we found no difficulty whatever in filling the time. In fact, if we had more time we could use it to good advantage. We went from fifty students down to eight, but we have come up again gradually to twenty-seven. I, for my part, want to stand by the four-year course.

Dr. F. C. Platt, San Francisco, Cal.

I want to call attention to something said by Dr. Noyes on the number of subjects the student is required to take at one time. Why should he take more studies at one time in a three-year course of nine months than in a four-year course of seven months, when he has the same number of hours in which to study?

Dr. G. V. Black, Chicago, Ill.

I want to remind you that we have a good many schools in the United States in which a three-year course of nine months is impossible, and the gentlemen directing these schools feel so, especially the Southern schools. If we return to the three-year course, it is almost inevitable that we return to the three-year course of seven months, a backward step that we do not wish to take. Therefore, I think that we should put away this idea that all schools can come to the three-year course of nine months.

Another thing: I do not believe that all students abandon work during their vacation. A large percentage of our students stay in the infirmary, so that they really have a nine or ten months course. But aside from this, we need the additional year for the extra work that is demanded of us; the additional preparedness that is demanded of our dental students that we cannot give them in three years' time.

**Dr. J. B. Willmott,
Toronto, Can.**

All the good medical schools have four years, of from seven to nine months, and we are belittling dentistry by cutting our course down to three years. We are publishing to the world that it is a profession inferior to medicine. This we ought not to do.

As to the nine-months course: We live in a very stimulating climate, and yet we find that even at the end of a seven-months course students who have applied themselves very seriously to their work begin to lag, and it is not uncommon for them to break down in the examinations. If they were to continue at the same gait, with the same application, it would be absolutely impossible for them to keep up for another two months, especially in a warmer climate.

A short time ago, in conversation with one of the professors in the University of Toronto, I asked him his opinion with regard to the nine-months course as compared with a shorter course. He said that after many years of experience he had come to the conclusion that men learn more in seven months than in nine, because they cannot keep up the pace so long. I believe that to be true.

**Dr. W. S. Bebb,
Los Angeles, Cal.**

Our school is most heartily in favor of the nine-months course and high school graduation for admission to the dental college. If we in Los Angeles can stand the heat, I do not see why the other Southern schools cannot do likewise. I have never noticed the disposition on the part of the students to lag at the end of the course, as was mentioned by Dr. Willmott.

**Dr. S. H. Guilford,
Philadelphia, Pa.**

I cannot agree with Dr. Willmott. I think he makes an unjust comparison between medicine and dentistry. He thinks we would be belittling dentistry to go back to the three-year course of nine months, after having adopted a four-year course. His idea is that we should take a stand alongside of medicine; that we should claim it; demand it, and hold it. The fact remains that medicine stands higher than dentistry, and anyone who studies medicine covers a larger field, immensely so, than ours. It includes a wider range of studies, and covers them at greater length, therefore the student of medicine studies more hours and harder in four years than the dental student, so that they cannot be compared at all.

In regard to the argument that in some parts of the country it would not be feasible to have a nine months' course, let me call your attention to one fact. A few years ago the Faculties Association decided to adopt a seven months' course, and met with this objection, principally made by Dr. Brown, of Milwaukee, who said that the Milwaukee Medical College had a six months' course and that the dental department could not extend the course to seven months. The same objection was made by some other school. Dr. Brown asked permission to have a four-year course of six months, instead of three years of seven months. That would be a solution of this problem, to allow the schools that preferred a three-year course of nine months to have it; and to allow those that preferred four years of seven months to have that course.

Dr. C. P. Bethel, Columbus, O.

It seems to me that the estimating of the course by years and months is not exact. It is more or less misleading. The Faculties Association has adopted a four-year course of seven months. Taking a school that begins its course, for instance, on October 6 and ends it on May 5, a full seven months, you will find that there are 135 teaching days, estimating five days per week, which the majority of schools are teaching. In four years there are 540 teaching days. That is the standard accepted by the National Association of Faculties and Examiners. Now, in speaking of schools that wish to adopt a three-year course of nine months and those that wish to adopt a four-year course of seven months, let us make a comparison, and see what we will find.

Take, for example, the University of Michigan, a college looked upon as a leader in dental education, is a nine months' school. According to their announcement they have three days' vacation during Thanksgiving week; two weeks vacation during the Christmas holidays, and ten days in the spring vacation, giving them a total of 168 actual teaching days in the nine months. Now, let the seven months' school teach six days per week instead of five, and during a full seven months' session they will have 169 teaching days, or one more than the University of Michigan has in its nine months' term.

At the Ohio Medical University our present term is thirty-two weeks, We believe in keeping our students busy, so we teach Saturday as well as other week days, and by doing that we get in 181 teaching days during the school year, or thirteen more teaching days than the University of Michigan. In four years we have fifty-two days, or ten and a half weeks, more actual teaching days in our course than Michigan, although our school is looked upon as a short-term school. Take this same school and length of session, as stated, teaching only three years, and we find that they would have 543 teaching days, or three more than is required by the Faculties Association, and what is accepted at the present time as the standard of a full course in dentistry.

If, then, in three years, schools of this length term have accomplished all that the Faculties Association requires of any school, why should they not be permitted to grant a diploma at the end of that time?

I believe, to be exact and just, that our dental course should be estimated by teaching days, and not by years and months, which is so misleading. Let us adopt a minimum number of teaching days in each year, and in that way place the work on an exact basis, so that all schools will have the same length of total course. If we adopted 540 teaching days as our standard we would not be taking a backward step, for that is all that is now required. There would not be any retrogression, and yet it would be possible to graduate students at the end of three years instead of at the end of four.

Dr. Hunt. Dr. Black says he lost my paper. I am sorry, because his discussion did not get within forty rods of the paper at any time. He says that he has not given any serious thought to the four-year course, and that he expects it to work itself out in a few years. If he had given this matter the attention that Dr. Willmott did or that I did, he might have arrived at some definite conclusions by this time. I took up the four-year curriculum, with the desire to put it into execution, and not in the hope that it would finally work itself out, after a fashion. And it was this desire to put it into execution that led me to the conclusion at which I arrived. Dr. Black rather begged the question when he talked about students coming in in time. I tried to make it understood that I was not arguing the question from the standpoint of the number of students that would present themselves, but from the basis of whether this additional time was really needed. I regretted that he took up the financial end of the question, because I eliminated that purposely from my paper.

The question is, is there a limit to the amount of time needed. If we need four years, do we need five, or ten years, or twenty years? There must be some time that is ample for the teaching of dentistry. I argue that if the subject is presented properly three years is enough. Dr. Black does not argue that point at all. He says that we have gone to four years, so do not let us go back. If three years is enough, why stick to four? If we can arrange the three years to give the same amount of work as in four years, why make the student remain in school the extra year? Those are facts, and not sentiment.

I purposely talked pretty roughly about the rewards in dentistry. It was neglected by the other speakers, much to my disappointment. When an ambitious boy leaves school he believes that by the time he is thirty-five years old he will have the world by the tail and that he will be looking for a place to throw it. The young man just out of school is not looking for an occupation that will give him a "modest living;" he is looking for an opportunity to achieve great things. He wants to be rich and renowned.

But take the ordinary bright young man with ample opportunities in the way of preliminary education, and let him look over the field. Does he find any men in the dental profession who are known, like Senn, Jacobi, Lister, Hare, and others in the medical profession? Or like Choate, Elihu Root, Chief Justice Harlan, and other noted lawyers? Where are our dentists that come before the eyes of the world like the men in these two professions? We do not have them. Most of us keep out of the poor house, and some pay rent instead of moving every month, but none of us get the rewards that are given to the foremost men in medicine and in law. I was not talking about the general run of practitioners, but about the leading men. Take the ten best dentists in Chicago and compare them with the ten best physicians and lawyers, and they are not in it for prominence. It is not a matter of brains or learning, but the profession does not bring them before the community in a prominent way, and the young man who is about to enter upon his studies in some profession, if he looks at the matter in a calm and dispassionate way and is not influenced, cannot help but note the fact that the profession of dentistry does not offer to the very best men in it the rewards the other professions offer to their best men.

That is the point I wanted to bring out in the paper. There is no man to whom I will yield in loyalty to the dental profession, but I see no necessity for trying to throw sand in each other's eyes.

Dr. Black also said that we need the extra year because we cannot turn out the men we should in three years' time from the material presented. That is a part of my argument. You cannot turn out good men from the material presented. But how can you improve the material presented by adding another year to the course? Get better men in the freshman class and you will not need that other year. The fact that there are some resolutions pending to relieve some of the evils that exist does not enter into the argument. I treated of conditions that exist now, and not of those that might exist some time in the future.

Dr. Willmott said that dental students are physically unable to take a nine months' course. Are dental students less able physically to take a course in education than are the students of liberal arts colleges? I took three years of nine months in a liberal arts college, and I am pretty husky yet. I believe dental students are capable of attending school nine months and doing harder work than they do now. Dental students are not worked hard.

Dr. Friedrichs says that the specialist in medicine must have further preparation. Of course he must. If, after graduating in medicine, a man wishes to practice rhinology or laryngology or any other specialty, he should have further preparation. But here is the point. While it takes just as long to get the D. D. S. degree as it does the M. D., the latter may choose between several specialties, while the former has but the one. After a few years in general practice the young M. D. may find his talents leading him toward a certain specialty as being the one he is best fitted to practice, and a little special preparation fits him to practice it. But if the young man in dentistry is not fitted for success in that one specialty, his diploma is worthless to him. Medicine offers a diversified field, in which a man may look for his life work; dentistry confines his choice to the one specialty. And yet it takes the same length of time, according to our rules, to secure a diploma in each profession.

I am not arguing for retrogression. I do not like to go backwards, but I do believe that there was not an argument presented here today that can be discussed outside of sentimental grounds. I do not believe in trimming our sails according to what the world at large will think of us. If a thing is right, it is right; and if it is wrong, it is wrong. I like what Dr. Platt said. I would rather hear a man argue a point than to resort to sentiment. This is a matter of importance that should be settled on a proper common sense basis, and not on sentimental grounds.

How Shall Quizzes Be Conducted?

By Faneuil D. Weisse, M.D.

The quiz is a most important factor in the imparting of a professional education, therefore its conduct deserves careful attention to obtain the greatest advantage from it.

Passing questions promiscuously from student to student is of little personal value to the student, and of no permanent value to the professor—especially when the fact of prompting is considered. Stated written examinations during the session—mid-term or more frequent—have not the zest and value of the frequently and carefully conducted quiz before the class.

No fixed dates should be scheduled for the quiz; thirty to sixty minutes per week should be devoted to it in each department.

That the quiz should be impressed with its importance the professor should conduct it; not delegate it to his assistant nor to a quiz master.

The objects to be attained from the quiz are:

(1) That the student may give evidence of, and personally realize the progress he is making in acquiring his knowledge;

(2) That the listening class may profit by the questions and answers —taking notes of the same;

(3) That the professor may realize what progress he is making in imparting his subject to his auditors;

(4) That the professor may judge of the individuality of each student as well as of his accumulating knowledge;

(5) The obtaining of a permanent record of the answers of each student so as to be able to economize the work of the progress (written), or final examinations (written or oral) of the session.

The conduct of the quiz presents two standpoints: the examiner and the students to be examined.

(I.) *Conduct of the examiner.*

The first essential is that the examining professor be prepared to give out his questions rapidly—there should be no halt in asking the questions. To accomplish this the examiner should have a written sequential list of subject headings before him to frame his questions by.

(Indeed, a professor's work is not fully systematized until he has drafted a sequential synopsis of the subject heads of his course of lectures —such a synopsis becomes the compass for all his work of lecturing, quizzing and the end of session examinations.)

The second essential is that the examining professor be provided with a list of the class—by which a permanent record of the quizzes is obtained —on a broad sheet, the line of the student's name to bear the record of the dates of his examining and the tallies of his answers at each examination. (Such tally record of the answers at quizzes by the respective students should be given due weight at the progress and the final examinations at the close of the session.)

(II.) *Conduct of the students to be examined.*

Call out ten students indiscriminately and without previous notice; seat them before you with their backs to and apart from the class—to avoid prompting. Read out the name of one of the ten, who, rising in his place, is asked question after question until he fails, when he sits down;

and so one after another is read out, questioned and seated. When the ten have been finished with they return to their seats in the lecture room, and ten more are called out and similarly dealt with.

As each correct answer is given the professor having entered the date of the quiz on the student's line of the tally sheet, it is tallied after the date. As the ten students return to the lecure room seats the number of correct answers of each is given to the class.

An incidental and most valuable method of quizzing to impress important points, which meets with much enthusiasm on the part of the class, is to unexpectedly—upon entering the lecture room or during or before closing the lecture—call for *viva voce* answers to questions, repeating and revising them from day to day until the examiner realizes that the entire class knows them.

The quizzes, by sections of ten as above detailed, call forth the fixed attention of the entire class and the taking of notes.

As the correct answers of each student are given out to the class—many making excellent records—the genuine enthusiasm evinced by facial expression and applause of the class at a good record reminds one of the enthusiasm shown at athletic games.

How Shall Quizzes Be Conducted?

By L. P. Bethel, D.D.S., M. D., Columbus, O.

Any one can ask questions, but not every one is a successful quizmaster. To better understand what methods of quizzing are most effective, we should first consider the object of the quiz in class work. The object, as I understand it is:

First—To test the student's knowledge of the subject covered by the teacher.

Second—To make the student review thoroughly the lesson recited or the notes he has taken on a lecture.

Third—That the student may gain additional information regarding any portion of the subject he may have missed, or that he did not fully comprehend when it was presented.

A single examination at the end of a semester or at the completion of a session is not, in the opinion of the writer, a thorough test of a student's knowledge of the subject under consideration.

Why? Because the student may be able to answer correctly all, or nearly all, the questions asked in examination and yet be deficient in many portions of the branch not touched upon in that examination. Or, he may be unable to answer satisfactorily the majority of questions asked and yet have a better knowledge of the branch in general than some others who may be able to answer creditably these particular questions. But by quizzing students the teacher soon ascertains who is applying himself and who is not. I believe a daily record of the quiz, or recitation, is of more value as an indication of the student knowledge in any particular branch than any written examination.

It is important then to ascertain how the quiz should be conducted to be most effective. But what is implied by the term "most effective?" In answer to this we might suggest the following propositions:

First—To go over thoroughly the subject under consideration.

Second—To bring out any points the student may have missed or those not fully understood nor comprehended when the subject was presented.

Third—To give a fair hearing to the student being quizzed.

Fourth—To hold the attention of all the students during the quiz hour.

Fifth—To make the student keep reviewing the subjects gone over.

Let us see how this may be accomplished:

First—"*To go over thoroughly the subject under consideration.*" A teacher may be conversant with his subject and yet omit important points by quizzing in a miscellaneous manner. The questions should cover thoroughly the subject matter as presented. I believe in preparing for the quiz the same as preparing for a lecture or recitation; and in preparing I have made it a custom to formulate questions covering progressively and thoroughly the subject matter, and requiring the students to write down all questions asked in the quiz. This is for two purposes: One, that no portion of the subject may be overlooked, and the other, to give the student a working formula from which to study in reviewing. The questions following the text as they do, in a progressive order, enables him to find quickly in his text-book the subject matter referred to by the question asked.

This brings us to the consideration of the second proposition, viz.: "*To bring out any points the student may have missed, or those not fully understood nor comprehended when the subject was presented.*" If the student does not obtain all these points from the answers during quiz, his having written out the questions, and the questions covering the subject thoroughly, give him a means of ascertaining and studving any portions of the subject about which he may feel uncertain.

Proposition third: *"To give a fair hearing to the student being quizzed."* A recitation, or quiz, is probably as trying for the student as any requirement he undergoes, and he should not be called up in such a manner as will embarrass him unless it be as a reprimand. He should be given every opportunity possible to show just what he does know or does not know about the subject, and no restrictions should be allowed.

Fourth proposition: *"To hold the attention of all the students during the quiz hour."* This is difficult to accomplish at all times, and to accomplish it often taxes the teacher's ingenuity. I have made it a custom to never quiz a class in any regular order, but to skip here and there, even recalling some one who has already been quizzed in the same hour if it seems advisable in order to hold closer attention. One must keep the members of a class in a state of expectancy, and my custom has been to ask the question first, then call upon some one to answer. By doing this every one is formulating an answer expecting to be called. If I notice inattention on the part of any particular student, I aim to call upon him. Some times in the midst of a recitation by some one else I will say: "Mr. Blank, you explain this, or explain the rest of this subject to the class." If he has been so inattentive that he did not hear what was recited or lost the connection and asks me to state the question again, I simply mark him zero for inattention and call upon some one else. The next time he is found giving due attention, for he realizes that the quiz markings count for considerable in the final reckoning.

Fifth proposition: *"To keep the student reviewing the subjects gone over."* The members of my class do not know when they assemble for quiz whether that quiz will be entirely on the last recitation, or lecture, or on some of the work already taken. I may ask them questions from several different subjects gone over before beginning on the topic in hand. Or, instead of a quiz, I may require a written recitation at any time. The written recitation appeals to me as a good drill, and although it entails more work on the part of the teacher I believe it pays to give such tests every few weeks. The students who are becoming indifferent to study I aim to quiz all the harder, and it usually whips them into line. At the end of the quiz, I allow enough time for any questions the students may desire to ask, or to explain to them any points not clearly understood.

While this particular method has proven successful in my hands, I do not believe any one method to be equally effective for all teachers. Each teacher must work out his own. That method by which he can best attain the desired results—for the results are what we want, no matter how it may differ from others—is the method for him to follow.

How Shall Quizzes Be Conducted?

By Robt. H. Nones, D.D.S., Philadelphia, Pa.

How shall quizzes be conducted? This is indeed a more important subject to the student body and colleges than is generally accredited to it. Is it not at the quiz that the student seeks for a clearer explanation of subjects? The righting of misunderstandings and misinterpretated meanings? Therefore, I say, it is indeed essential that much thought should be given to the selecting of quiz-masters, number of quizzes per week, hours for quizzing, system of quizzing, etc.

Let us first turn our attention to the system of quizzing from a financial standpoint. Should the schools furnish a free system of quizzing? Should they be regularly listed as fees? Should they be conducted as private or special instructions? Should they be a part of the college curriculum, or should the quizzing depend upon the professor of the chair, devoting a few moments of each lecture hour to quizzing? The answers to these many queries could readily be "Yes" or "No."

The school which furnishes a free quizzing system no doubt offers a greater inducement to the prospective student, but it is a doubtful question whether he receives and gives the general prompt attention as when he has invested a few dollars for private quizzing, unless the institution has a financial standing which would warrant its properly compensating the quiz-masters for the value of their services and time demanded. Institutions so constituted are much in the minority rather than the majority. Then again the receiving of something for nothing is but little appreciated by the human race (the student body being no exception to this failing), therefore the student does not feel in duty bound to attend regularly and promptly; hence much of the quiz-master's efforts are lost. A free quizzing system, at least to some extent, is a necessity, and this I think should be conducted by each professor and lecturer, supplementing the regular quizzes by a few moments of his lecture hour to quizzing on the subject matter previously gone over. This is essential, not alone for the student, but it should also enlighten the incumbents of the different Chairs as to the clear elucidation of their teachings; whether their individual methods are fruitful to the greater number, or but to a few; whether the answers brought out should demand a reconstruction or modification of lectures. It is this personal quizzing by the lecturer which calls his attention to such matters not understood and warranting a repetition of the subject. It is that part, therefore, of a course, which is of priceless value to both teacher and student as it is in many instances the last opportunity given to right wrongs.

Personally I believe that private quizzes, preferably conducted by assistants of the individual chairs or by regular appointees of the Faculty, would be productive of the most good, for the reason that the student would not absent himself and he undoubtedly would give better attention to that for which he pays. The quiz-master having the individual responsibility placed upon him would look to his laurels and the remuneration which should naturally increase with better work would be an incentive to do his utmost.

If the quiz-masters receive a liberal compensation for their efforts the institution could then make a selection from more applicants. Too much stress cannot be laid upon the personnel of the quiz-masters; not enough attention nor sufficient recognition is given them. Their selection should be made carefully with a view of strengthening, not only the individual Chair but the institution as well. The light of the quiz-master should not be prevented from shining, for fear of eclipsing the merit of the senior teacher, the Professor of the Chair. To accomplish the most good and best results one must frequently sacrifice one's feelings longest as the title does not necessarily make the most efficient teacher.

After the selection of a competent quiz-master has been made, his duty should be clearly mapped out for him by the Professor of the Chair, and one of the most important, I believe, is to have him attend each lecture on the subject on which he is to quiz. It is impossible for him to keep in close touch with every thought of the teacher in any other way. Reviewing the lecture notes will not suffice, and by his attending the lectures the students are fully aware that he is well posted, at least on the idiosyncrasies of the professor. It is imperative that the quiz-master be thoroughly qualified; he should command the attention of the student body; frivolity at no time should be allowed to enter into the quiz hour, nor careless nor partial answers be accepted.

The different subjects naturally demand different methods of conducting a quiz, but modifications should not prevent the carrying out of salient points equally valuable to all branches, for example: The individual mind should be constantly kept upon the subject and not allowed to be lax before or after he has answered the question put to him. One way of so doing is that of putting the questions in a regular and systematic manner; questions should not be allowed to pass unanswered too long, for fear of the students losing interest; concise and thorough answers only should be accepted, and all answers and questions should be audibly and plainly given to the entire class, as well as a clear and proper explanation, particularly of the incorrect ones. The quiz hour may easily be made a medium for ridiculing those holding incorrect views. This should never be tolerated, as it will be followed by lack of respect as well as embarrasment of the student thus made a mark of. Correct or incorrect marks should be entered against each student, not only as a matter of reference but also as an incentive for him to carefully consider questions before answering. Haphazard methods should absolutely have no place in the quiz room; as previously stated, it is here the last chance for correction of misunderstood theories and methods is met. For this reason alone it should be conducted with the utmost care, I would say even more so than the lectures, for upon whom does more responsibility rest, from whom is more individual teaching expected, or with whom does the student body come in closer contact than the quiz-masters and demonstrators? practically they are the teachers and makers of dentists.

Questions which can be answered negatively or affirmatively should be avoided as much as possible, as it is rare that such answers draw from the student any knowledge of the subject. Questions requiring answers with some degree of explanation give the student an opportunity to explain his thoughts and at the same time do much to prevent guessing on the subject. When a student is asked a question he should arise and answer in an audible tone so that the entire class may hear the answer. This also gives the student training in addressing a gathering as well as preventing laxity and carelessness in answers. This individual training amounts to more for a student than might be supposed; it is oft times not the lack of knowledge, but the result of self-consciousness that prevents a student doing justice to himself or the subject with which he may be thoroughly cognizant.

It might be advisable at times to allow students to take turns in conducting the quiz; this would not only be excellent training, but it would probably bring out questions on a line of thought which would not occur to the professor or quiz-master.

Interest can be obtained and retained by the free use of blackboards, diagrams, models, etc., which the student as well as the quiz-masters should use, and thus frequently be able to make themselves clear, when without the use of the same, answers and explanations may be very vague. It is absolutely requisite that the quiz-master be in thorough accord with the lecturer, as nothing will cause greater lack of discipline, be more destructive of confidence than the differences of opinions or methods between the professor and the quiz-master. This absolute understanding of the teachers is not liable if the quiz-master makes no pretense of attending the lectures on the subject, so I think it may be plainly understood why it is so important for the quiz-master to attend each lecture on the subject on which he is to quiz.

Every subject should be given a regular specified hour each week for a quiz and the time should be selected with a view of deriving the greatest benefit therefrom. I am fearful that it is not infrequent that the quiz hour is crowded into any spare time available, much to the detriment of the subjects reviewed.

The quiz hour should undoubtedly be recognized as part of the regular curriculum and attendance at the same should be required of the students just as much as at the lectures. It is a conceded fact that as a general rule the students acquire more knowledge at one good quiz hour than from many lectures.

Discussion.

Dr. F. H. Berry, Milwaukee, Wis.

I am in sympathy with the papers read and can add but little to the subject. I am teaching prosthetic dentistry, and, as you know, it is almost impossible to get good quiz masters, men of the same opinion as ourselves. I have a way of killing three birds with one stone. We all know what a difficult matter it is to call the roll, because students will answer for each other, and when you quiz they consider it a hardship, and they will say that you are partial. I have a quiz for ten of fifteen minutes before each lecture without having previously announced the subject of the quiz. I call on the first man on the roll and ask him to propose a question. I mark him on the merits of his question. Then I ask the last man, for instance, to answer the question. In this way I make the students do all the thinking. In order that you will not pass a question to the chum of the man who asked it, it is well to dilate on the question yourself or to change it somewhat. I do not confine myself to beginning at any particular place on the roll, but am liable to ask any man at any time without any regard to the sequence of the names. I find that this is a very good way of quizzing, because they are propounding their own questions and the answers show where they are deficient; and then you can enlarge on that particular phase of the subject.

Dr. J. B. Willmott, Toronto, Can.

I would like to get a little information from the gentlemen who have had some experience with large classes. How, with a class of about 150, do they manage to make the men speak up so that they can be heard? Often I cannot hear the answer, and I am sure that many in the class fail to hear it, and these men will, therefore, lose all interest in the quiz.

Dr. N. S. Hoff, Ann Arbor, Mich.

Quizzes form a most important part of instruction. Some of the best schools in the country have done away with didactic work altogether. They assign lessons in the text-book and quiz on them. I have very little sympathy with the idea of employing quiz masters, except in the scientific subjects where good quiz masters are available. Every teacher should do his own quizzing, because if he turns his work over to an assistant he is likely to get poor results. Unless the teacher can bring himself into contact with his students he is not doing good teaching, because he does not get any conception of his students' grasp of the subject.

The difficulties with large classes, mentioned by Dr. Willmott, is one that appeals strongly to me. Sometimes I am unable to quiz more than three or four men in the course of an hour. I do not place any value at all on a parrot-like answer taken from a text-book or from my lecture. Nor do I feel flattered by that kind of an answer. I want the answer to show that the student has been thinking about the subject, showing that he has a mind of his own and that he can use it, if need be. Otherwise the entire system of quizzing is of little or no value. The mere memorizing of a lecture or lesson does not increase the student's understanding of a subject. Students should be encouraged to answer in their terms of speech, voice their own thoughts, even though they be incorrect. This will stimulate them to think while subjected to the embarrassment of their surroundings.

Last year I mentioned my method of quizzing, which I found very successful. I have a blank book made of very thin paper and between the pages is a sheet of carbon paper. I put two questions on the blackboard. Some of the men are asked to answer question number one, and others are asked to answer question number two. They are expected to answer these questions in their own words, and I so formulate the question that they cannot quote from any text-book or lecture. Then, after having answered the questions, they give me the original from their books, retaining the duplicate. I pick out those that are answered carelessly and badly, and as soon as all the sheets are in, I read the question and the answer, but without giving the names of the students, and solicit correct answers from the class. If I do not get a satisfactory answer, I give it myself. I find this method to be a very good one, as it quizzes every student in the class, and gives me a chance to restate a point that may not have been made clear in the lecture.

Dr. F. L. Platt, San Francisco, Cal.

I have established the rule that when a student does not answer so that he can be heard by every one the answer is to be counted a failure. I call attention to the fact that there is a great difference between thinking and wondering, and I never allow my students to do any wondering. My class usually is not a very large one, yet I always have a few bashful or deficient students. I give them every encouragement, and before long they manage to do very well.

Dr. E. H. Long, Buffalo, N. Y.

The last two speakers have touched upon one feature of teaching that has grown in my estimation year after year, and that is, teaching students to think. One of the greatest faults in the training in our technical and professional schools has been allowing students to give facts without developing in them a corresponding thinking and reasoning power. In anatomy or chemistry there is not much opportunity for the student to reason or think things out, because everything is fact, and each fact must be memorized. But in the practical subjects the teacher should always attempt to train his students to think for themselves; to reason out a question and draw their own conclusions, even though these are at variance with the opinion of the teacher. I always endeavor to present my work in such a way that the student must do some thinking for himself, and not simply answer in a parrot fashion.

I believe that the lecture method is the poorest of all methods of teaching. Of course, it is an easy method of imparting some knowledge, but it is also the poorest because we never know how much the student is learning. In my department—therapeutics—I employ the conference or quiz method as far as possible. I announce that subject to be discussed in advance, then I quiz probably ten men during the hour, giving each time to tell what he knows. I mark them on these answers, giving all to understand that these quiz marks will be taken into consideration in making up their final average at the end of the term. Credit is given as well for reasoning ability as for a knowledge of facts. These conferences are entirely informal and I invite my students to interrupt me with a question at any time.

Dr. Geo. H. C. Wilson, Cleveland, O.

Each man has his own method of quizzing. I have a method that has not been mentioned, hence I feel at liberty to give it to you. I do not feel it is wise to quiz immediately after the first lecture, because we have not yet covered much territory and the student cannot have a very intelligent idea of what he is expected to learn. We should cover a large part of the subject, perhaps one-half of the entire course, and then begin to quiz from the very beginning. Use alternate hours for the quiz and continue until you have covered the subject. The student knows when to expect the quiz, and he knows the work that is to be covered and that it will be taken up in the same manner as the lectures were given. In this way the work is a continuous story and the student can grasp it all, and when it comes to the quizzes he knows that it will be the last time that the subject will be considered before the final examination, and he will give the work his whole attention.

I pursue the method advocated by Dr. Bethel of asking the question first and then calling the name of a student. I notice that most students take down the question, and some are more interested in taking down the question than in answering it. When I see that, I tell them that the quizzes have much to do with the final marking. That if a man is unable to answer in the quiz a certain per cent will be taken off the final average.

I do not believe in the method of recitations *per se* as being the only method of teaching for the reason that the individual who can make the best statement should make it, and that, I believe, should be the teacher. If not, it is very apparent that the teacher is not the man for the place. As comparatively few students can answer well and promptly, I believe in the lecture system of teaching, to be supplemented by quizzes in which the teacher can draw out the student, and correct his mistakes.

Dr. Starr. (Closing the discussion for Dr. Weisse.) This system advocated by Dr. Weisse has been tried for only a short time at our school. Our plan is to bring five or ten men down into the amphitheatre, seat them in front of the examiner, and clear the benches immediately behind them, so that there is no danger of prompting on the part of their fellow students. Each man is quizzed until he fails to answer a question correctly. This method seems to stimulate men to work; it brings forth the spirit of rivalry, and a desire to make a good showing before their fellows. Dr. Weisse said that a student recently answered sixty questions before he failed. It seems to make students more earnest and anxious for the quiz.

The idea of propounding the question first and then calling on the student for the answer is a very good one and worthy of trial. In the New York College of Dentistry under the old method there was little interest taken in the quizzes, and the student, after having been called upon, gave no more attention to what was going on.

The Teaching of Orthopedic Dentistry.

By Calvin S. Case, Chicago, Ill.

Junior Technics.

Realizing, a number of years ago, that college classes in the technics of orthodontia under my direction were obliged to spend too much time on the preliminary work of constructing stock material and implements, and consequently not enough time on the more advanced stages of the technic work that are indispensable to advanced practice in this branch of dentistry, I have for several years put into practice the following rules, with the most marked improvement in the practical training of students:

First—That students should be taught in the technics of orthodontia only that which will be useful to them in actual practice.

Second—That the junior students shall be thoroughly trained in that portion of the technics which they may be called upon to practically apply in their senior infirmary practice.

Third—That the technic work of the class should be thoroughly systematized and pursued along practical lines, and consist in no more work than each student can easily and perfectly perform in two half days of each week for three months.

Fourth—That the principal portion of the technic work shall consist in the construction of practical finished material and appliances to be presented for grade markings, and become a part of the college stock material for the construction of practical regulating apparatuses in the infirmary practice.

In my opinion, technic students should be drilled in correct methods of obtaining plaster models for study, etc., the separating and measuring of natural teeth for bands, the soldering of bands and their various force attachments, the construction of movable and stationary anchorages, the uses of the draw and screw-plates for the drawing of wire and tubing and the threading of wires and nuts, the threading and tempering of taps, the construction of wrenches and unattached appliances, such as alignment bows, screw-jacks, etc., and the final finishing and plating of appliances.

In my teaching I have abandoned the requirement that students shall roll banding material, because of the meagre facilities for properly performing the work and the time consumed in the attempt, but principally because they will rarely prepare it in practice. The same is true of a large proportion of the other material which we now furnish to the students in a partially prepared state, requiring them to do only that portion of its completion that they would be called upon to perform in practice. The wire and part of the tubing they draw is only to train them in the use of the draw-plate, and is not considered as belonging to the stock, because, unless the wire is drawn through a specially prepared draw-plate, in all probability it will not be the proper sizes for threading in the screw-plate, and, moreover, it would require the frequent use of a micrometer gauge, which students will not buy, to determine and classify the sizes.

Believing that students should be thoroughly trained in the construction of different kinds of regulating bands, fully finished with attachments, that they may be called upon to construct for the regulation of teeth, the technic branch of this work contains all of the kinds that are used for different apparatuses, with full illustrations and descriptions of each. The teacher is expected to select and make chart drawings of the kinds which he wishes his class to make, and to divide the class alphabetically into sections, requiring each student to make at least twelve creditable bands for different teeth.

I would advise that students be required to take the band measurement of the *natural* teeth of the fellow used for the impression. In those cases where this is not possible, a technic rubber model can be submitted. The practical advantage to the student over the ordinary way of allowing them to take the measurements from the plaster models or dummies is quite as marked as it would be in other departments if students could not be supplied with practical infirmary cases, as too frequently occurs in this department. Occasionally, a student will object to the operation, claiming that separating will injure his teeth. But those who have the slightest interest in the advancement of their fellows or themselves will willingly submit to the unpleasantness; for that is all it amounts to.

The threading and finishing of blank taps, nuts and wires that are furnished to the class in accurate sizes, and the construction of a few kinds of jack and traction screws, will give to the student all the training necessary in this line.

Instead of requiring the student to construct the usual stereotyped regulating apparatus, with training limited to the demand of a few simple irregularities, appliances are now constructed by the entire class with training distributed so as to apply to nearly all characters of irregularity.

If the work is pursued, as it should be, along purely practical lines, it will offer to the student a far more thorough system of training for final practice, with less difficulties and time expended, than has been possible by a regime that requires the complete construction of implements and appliances and a final "show-up" apparatus from the crude material.

True success in teaching every branch of orthodontia which pertains to the construction and action of appliances, whether in practical or didactic instruction, will never be attained without the adoption of some standard system of sizes and the use of a screw-plate that will properly thread the few sizes of wire we require for the work. Then a large proportion of that which we use, or wish to refer to in our teaching, can be numbered the same as the wire for which it is constructed to fit.

In a paper presented at the meeting of this society in 1899 this principle of teaching was advocated, and I am pleased to say that it is now made absolutely practical by the use of the New Standard screw-plate. Heretofore, we have been obliged to draw wires that could be properly threaded in the screw-plates that students would purchase, the most popular of which has been the Martin; and as most of the sizes of the screw-cutting holes in these plates are either a few thousandths of an inch too large or too small to properly thread standard sizes of wire, students and dentists who attempted to make regulating appliances were obliged to redraw commercial wire through a specially prepared draw-plate that was adapted to the requirements of the screw-plate or screw-dies, which they happened to possess. In college work this required the use of an expensive micrometer gauge and a perfect knowledge of the exact sizes they required, a process that could only be determined by the skill of an expert for each of the various kinds of plates in the class, besides many other difficult and almost insurmountable complications.

In the teaching which I propose, the sizes or thicknesses of wire, blank taps, plate, banding material, and the wall thicknesses of tubing, will be recognized as the American (B & S) Standard Gauge sizes; whereas, tubing, screw-plate holes, taps, blank nuts, nuts and wrenches, will take their size numbers from the respective sizes of wire they are intended to be used with. For instance, a No. 18 wire can be perfectly threaded in a No. 18 hole of the Standard screw-plate; a No. 18 blank tap can be threaded in the same hole to make a No. 18 tap with which a No. 18 blank nut can be threaded to make a No. 18 nut, etc.

When it becomes necessary to speak of any of the above material in our teaching, the mere mention of name and number conveys at once an intelligent idea. Students soon become familiar with the few sizes required for the different appliances, and have a far more intelligent appreciation of the work in its several branches.

Nomenclature. A correct use of terms that could be universally adopted is greatly to be desired in this department of dentistry. At present we are hampered by the use of wrong or ill-chosen terms, which we are often constrained to cling to because of general usage. Again we are unhappily mystified by the ill-advised use of terms which certain prominent writers have adopted in their effort to find words that would more clearly and concisely express their meaning, and also perhaps to simplify that which should be more specifically and scientifically defined.

I would respectfully submit the following terms, with the hope that they will receive your consideration and adoption at this meeting as the standard expressions in this department of dentistry:

Irregularity. The terms irregular and irregularity, refer to teeth that are in malposition in relation to the normal alignment, occlusion, or esthetic contours of the physiognomy.

Alignment. Teeth are in alignment when they are in proper relation to the line of their dental arch. A tooth or teeth in malalignment constitutes an irregularity; yet all the teeth of the dental arch may be in perfect alignment and also irregular, as instanced by abnormal protrusions of the upper, and other conditions.

Occlusion. The terms occlusion and malocclusion refer solely —as in other departments of dentistry—to the occlusion of the teeth, one upon the other. When the teeth are in malocclusion, it certainly constitutes an irregularity; yet in many cases of decided irregularity, the teeth are not necessarily in malocclusion, as is well shown in full protrusions and full retrusions of the upper and lower teeth.

Therefore the terms malocclusion and malalignment when used, as they are by some writers, in place of the terms: "Irregularities of the Teeth," "Orthodontia," or "Orthopedic Dentistry," are ill-advised.

Mesial and Distal.

Mesial and distal when used to define malposition, occlusion, movement, etc., will be used only in the sense in which they were originally intended to be used in dentistry, i. e., toward or from the median line, in a direction along the line of the dental arch. Therefore they should not be used, as they frequently are, in the sense of anterior and posterior, front or back, or protruded and retruded. If "the upper first molars occlude mesially to normal in their relations to the lowers," this irregularity should not be defined as one "in mesial occlusion" and vice-versa, because occlusion is a word which has reference to the lower teeth as well as the upper in occlusal contact; therefore, the irregularity might as well be defined as one in distal occlusion. Again: The mesio-distal relation of the molar occlusion in no sense defines the real irregularity, because this relation does not necessarily indicate that the upper teeth are protruded or retruded, for the fault may be entirely with the lowers; or it may be partly with the lowers and partly with the uppers, etc. The real irregularity in these conditions can only be determined and defined by a careful study of the position of the teeth in relation to the features of the physiogomy.

Arch.

The dental arch is that inscribed by the teeth. The *alveolar arch*, that inscribed by the alveolar process and overlying gum.

Zone.

Zone is a favorable word for locating sections of the dental and alveolar arches that we frequently wish to refer to in describing different characters of general malpositions and movements; as, occlusal or incisal zone, gingival zone, and apical zone.

Compound Terms.

The adjectives, *mesial, distal, labial, buccal, lingual, occlusal,* and their combinations, can be happily used to exactly define certain malpositions, movements, points of attachment, direction, etc.

The direction in which a tooth is mal-turned or rotated may be perfectly defined with a compound word if it is understood that the first member of the term refers to the surface of the tooth and the second to the direction of its malposition or movement. Thus, teeth are mal-turned, rotated, or require to be rotated, linguo-mesially or linguo-distally. Again, a tooth may be in mesial, distal, labial, buccal or lingual *inclination,* or in labial, buccal, or lingual *malalignment,* etc., etc. The malposition of an upper left lateral incisor that is said to be mesio-labially inclined, linguo-mesially mal-turned, and in labial malalignment, is not difficult to see "in the mind's eye."

Anterior and Posterior.

Anterior and posterior are words that are so well established by common usage, that it would be difficult if not impossible to drop them wholly from our nomenclature, as much as we would wish to. When used to define relative position or movement in a direction parallel to the median line of the dome, they are frequently of great advantage. In referring to general relations, it is far more sensible to say the "antero posterior relation" of the upper and lower sets of teeth than the "disto-mesial relation," because the latter words could refer only to the molars or biscuspids in the direction of front and back; though if wishing to refer only to the relation of the buccal teeth, the term "mesio-distal relation" would be preferable.

Protrude and Retrude.

The syllable "trude" (from trudo, to thrust) with certain prefixes, as Pro (forward), Re (back), Ex (out from), In (into), and Con (in upon), gives us a class of words of distinct and scientific meanings. Teeth are protruded or retruded only in respect to their normal facial relations, and in no instance can this be determined or defined by the occlusal relation, as some writers imply.

Extrude and Intrude.

Extrude and intrude apply to teeth which are not in proper relation to the normal occlusal plane, and commonly spoken of as teeth that are too long or too short. The terms will be used particularly to define malposition of one or more teeth whose occlusal surfaces or incisal edges are not normally even with those of their adjoining fellows. When the condition involves all the front teeth, it will of course constitute an "open or close bite irregularity" though correction may be properly defined as the partial intrusion or extrusion of these teeth.

It is frequently desirable to speak of the six front upper or lower teeth as having moved or requiring movement, in phalanx; the same is true of the right and left upper and lower side teeth; therefore the term, *"Labial Teeth"* may be used to refer to the incisors and cuspids in single phalanx; and "Buccal Teeth" to the bicuspids and molars in single phalanx.

In referring to the general location of teeth, would it not be decidedly advisable to say *front* or *back* teeth instead of anterior or posterior teeth; and *upper* or *lower* teeth, instead of superior and inferior teeth?

Mal-turned and Rotate.

When a tooth is abnormally turned on its long axis it is "mal-turned." The term "rotate" and its suffixes refers preferably to the act or need of turning it.

Classification.

The teaching of the department of orthodontia has been especially difficult because of the almost limitless variety of malpositions which irregularities of the teeth present, and particularly because irregularities of the teeth have never been systematically nor scientifically grouped so that one could talk or even think of them as belonging to a class or type that required a certain order of treatment, or that differed from other classes because of certain recurring important variations, or that produced a certain facial deformity or effect, that differed from others whose teeth seemed to be in the same relative position.

In my opinion it is unfortunate that the last two text books written upon orthodontia place all irregularities of the teeth in three classes, divided and grouped according to the disto-mesial occlusion of the first permanent molars. That is to say; all irregularities of whatever character which occur with the molar occlusion typically normal are placed in one class; those which occur with the upper first molars occluding mesially to normal in relation to the lower, and *vice-versa,* are placed in the second and third classes respectively.

At the last meeting of the Illinois State Dental Society, I was constrained to present my opinion of this method of classification; and in detail I explained how the first class selected upon the basis of a typically normal molar occlusion must of necessity contain five distinct varieties of general irregularity, which differed in almost every respect from each other. I also claimed on that occasion, that the second and third classes, if grouped on the basis of the above conditions, would be found equally faulty when considered in the light of a classification designed for the information and practical advantage of students and busy practitioners.

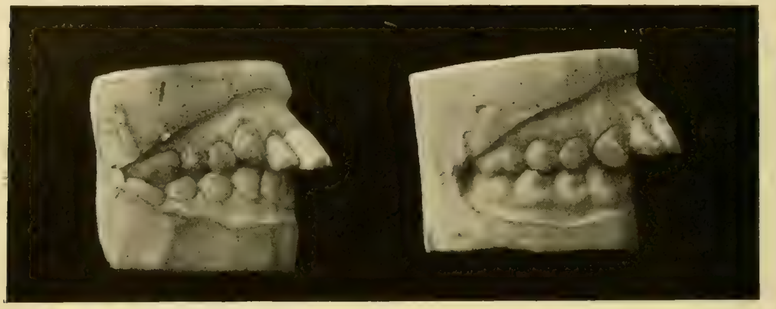
To more fully illustrate the purposes of this paper, which is purely a discussion of the choice of methods of teaching, and to not repeat that which has already been published, I will take the liberty of showing the different distinct types of irregularity of the teeth which we would be obliged to place in the second class, grouped on the basis of the upper molars occluding mesially to normal in relation to the lowers.

These constitute seven common irregularities that are distinctly different from each other, both as to their relation compared to the normally esthetic, and the movement which they demand for correction.

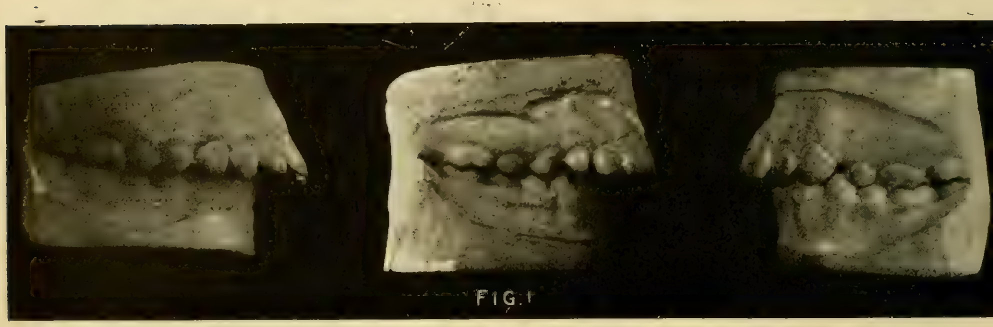
In going into this branch of the subject I trust that it will not be considered solely in the sense of a criticism. I introduce my views mainly to illustrate the principles I shall propose, which should govern classification, fully conscious that the advancement of every science has always been through a pathway of errors and that we should look upon them only as stepping stones to our progress.

To show how impossible it is to determine the real character of an irregularity of the teeth as a guide to treatment by the relations which the upper and lower teeth bear to each other, I will ask you to glance at the lantern projections of five cases from practice. (See Fig. 1.)

If you had the plaster models of these cases for careful examination, you would say they are very like each other in all general relations; the same apparent protrusion of the uppers in relation to the lowers; the same disto-mesial relation of the first molars—the upper standing about the width of a biscupid in front of a typically normal occlusion with the lower.



Case 1. Case 2.



Case 3. Case 4. Case 5.

Perhaps you will notice that in some of the cases the teeth are more labially inclined than those of the others, but this often occurs in two cases of the same facial deformity because of the unequal thickness or disposition of the overlying tissues which aids in characterizing the facial contours; with the same argument you might notice that there is a slight but noticeable difference in the occlusion of some of the cases; and yet if they produce the same facial deformity I claim they should be placed in the same class, because the movement required for their correction and the particular force which the regulating apparatus should exert would be practically the same. It happens that these cases to which I have called your attention belong to five distinctively different types of facial deformities, requiring for their correction decidedly different movements of the teeth and consequently different orders of force apparatuses. (See Fig. 2.)

Taking them up in detail: The *first* (See Fig. 3) is the most common form of upper protrusions, which require for their correction a retrusion of the crowns of the six upper front teeth.

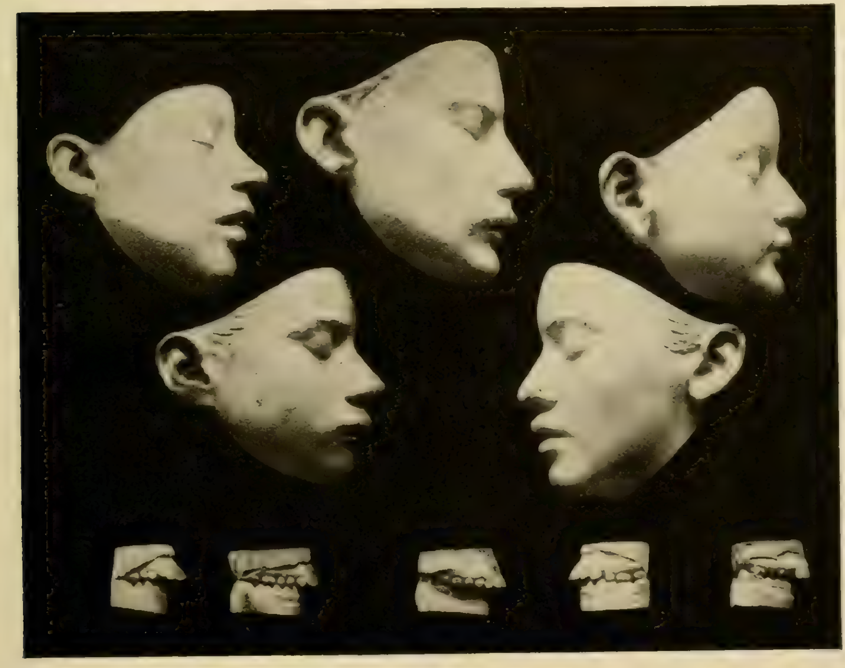
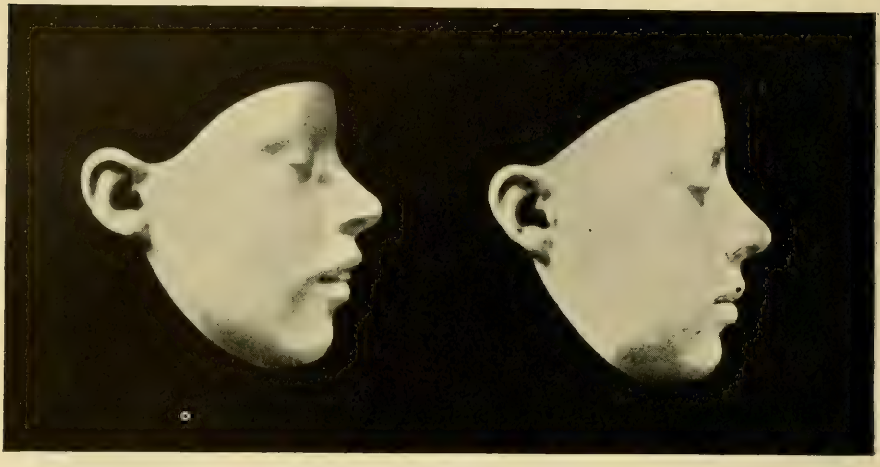


Fig. 2.

The *second* (See Fig. 4) differs from the first in that the roots of the front teeth are also protruded, producing a greater prominence or bulginess along the upper part of the upper lip and around the wings and nostrils of the nose. These cases require for their perfect correction the retrusion of the roots as well as the crowns; an operation that can only be successfully accomplished with a specially constructed apparatus that is entirely different from that required in the first form. Notice, if you please, the intermediate stage of the operation. Up to the time when these intermediate models were made, the patient had been wearing an apparatus which applied a single force near to the gingival margins of the teeth, with the view of distributing the movement to the roots, or as much as it is possible to do so with force applied at a single point upon the crown. And yet we can see, with the crowns alone retruded, that the protrusion over the apical zone is even more marked than it was at first. The final result, shown by the models on the right, was obtained with an apparatus specially designed for retruding the apical zone of the incisor teeth, which, as will be seen, reduced the unpleasant prominence along the upper part of the upper lip.



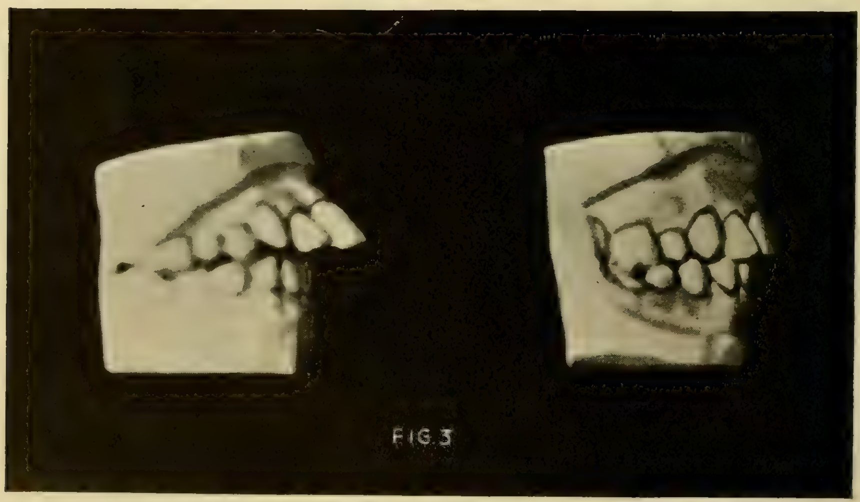
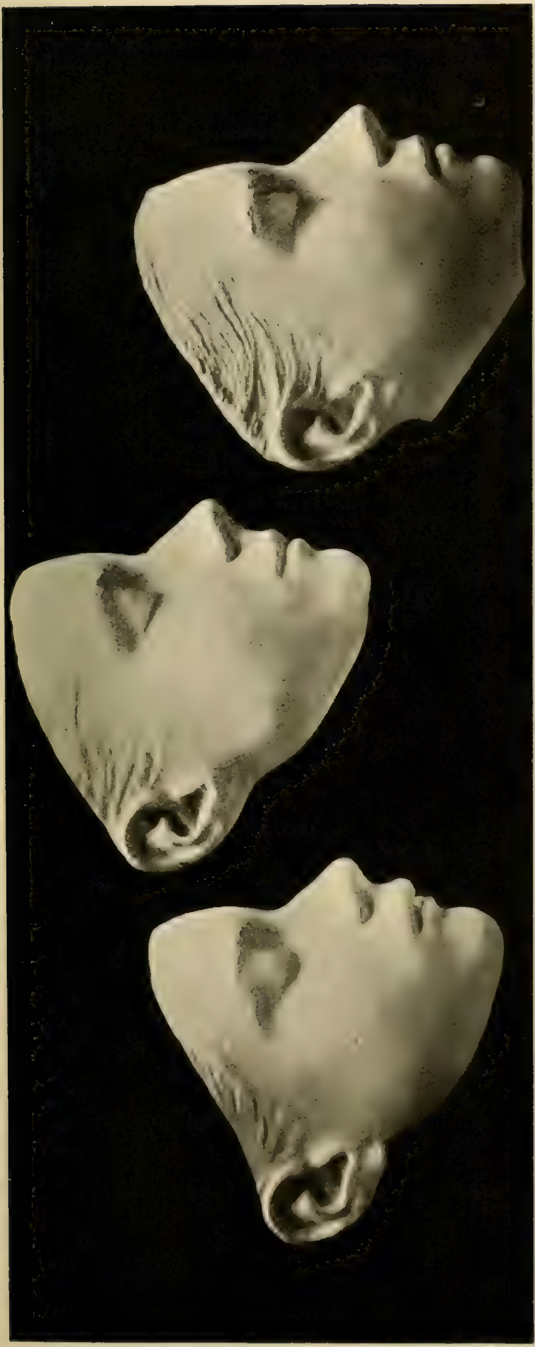


FIG 3



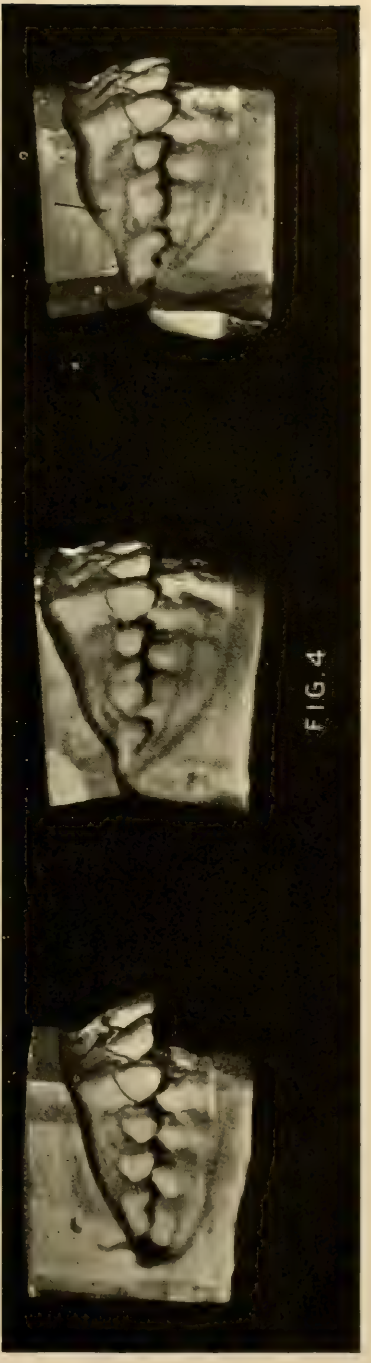
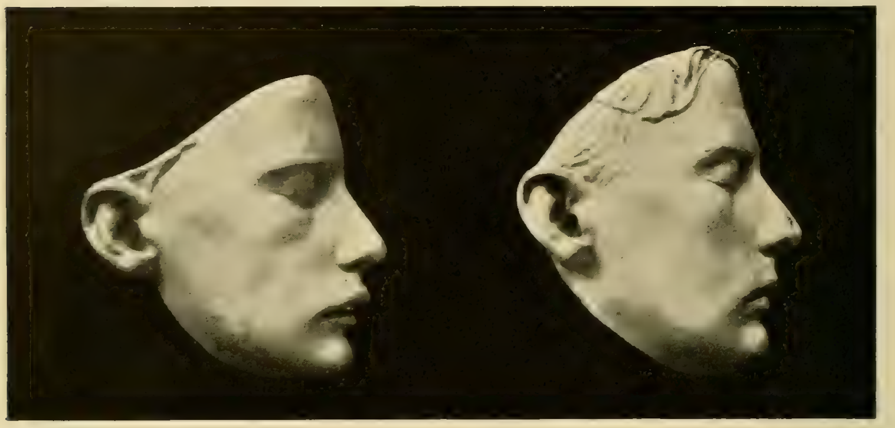


FIG. 4

The *Third* (See Fig. 5) is a protrusion of the upper teeth, and a retrusion of the lower, another marked differentiation in character and demands.

The *Fourth* (See Fig. 6) is a retrusion of the lower teeth, with the upper normal; a not uncommon irregularity that is widely different from the first in which the upper alone was protruded.



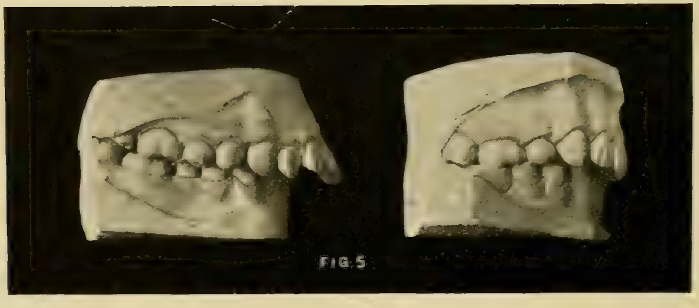
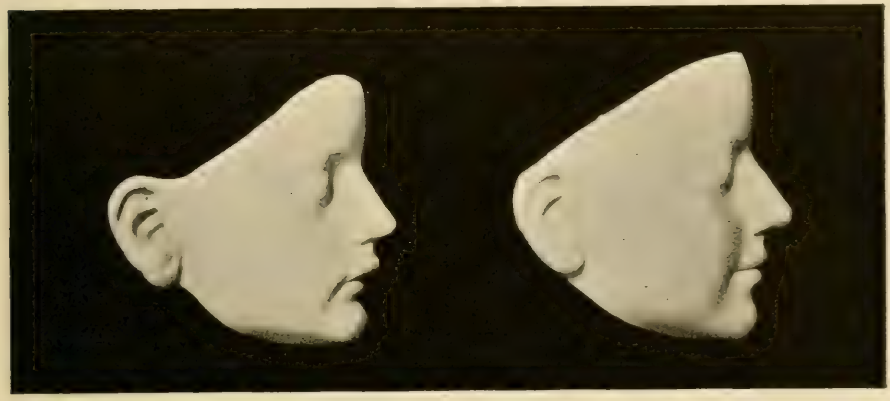


FIG. 5

The *Fifth* (See Fig. 7)is a compound irregularity, which in its most marked form produces a depression along the upper part of the upper lip, with a deepening of the naso-labial lines and a protrusion of the lower part of the upper lip. In these cases the general inclination of the uppers may differ somewhat without changing the peculiar characteristics of the class, which are: a retrusion of the apical zone and a protrusion of the occlusal, demanding an apparatus that will protrude the roots and retrude the crowns, or the protruding contour apparatus, with a movement that is entirely different in its demands and action from either of the others.

It is not presumed that these marked characteristics will always be found in the pronounced forms of the cases I have shown, but in all varying degrees in the antero-posterior relation of the upper to the lower teeth, and also to the unchangeable features of the physiognomy. In other words, the peculiar characteristics which I claim constitute a class may be found merging into that of another class, requiring an intelligent appreciation of the real condition and demands of treatment that cannot be gauged by cut and dried rules. It seems to me, however, of eminent advantage, especially in our teaching, to have these division guide-posts of class characteristics to work to or from, instead of placing distinctively different irregularities in one class because they happen to be alike in the single particular of molar occlusion; especially as this tells us nothing of the real condition, nor points the way to its correction.



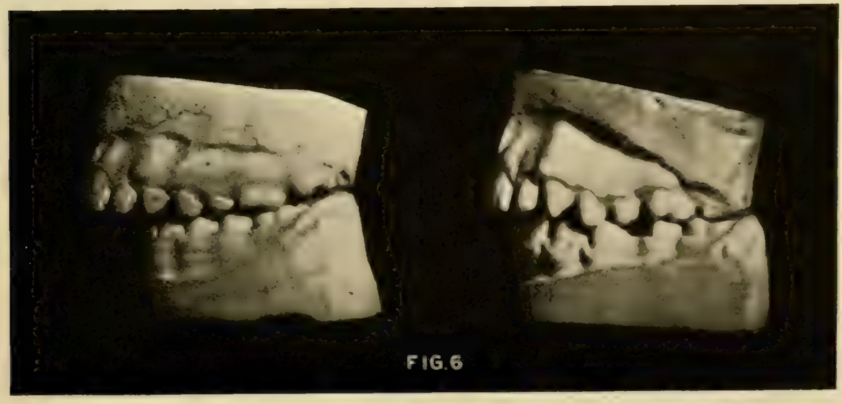


FIG. 6

The *Sixth* (See Fig. 8) typical character with the same occlusion of the first permanent molars, is the inherited bodily retrusion of the lower teeth and jaw, and facially characterized by a retruded chin. These cases demand for their perfect correction the operation which Dr. Kingsley has so aptly named, "jumping the bite." In the typical form they are very rare in my practice, as this deformity is nearly always accompanied with more or less protrusion of the uppers, as shown by the illustration, which was partially corrected, as will be seen, by the retrusion of the upper teeth.

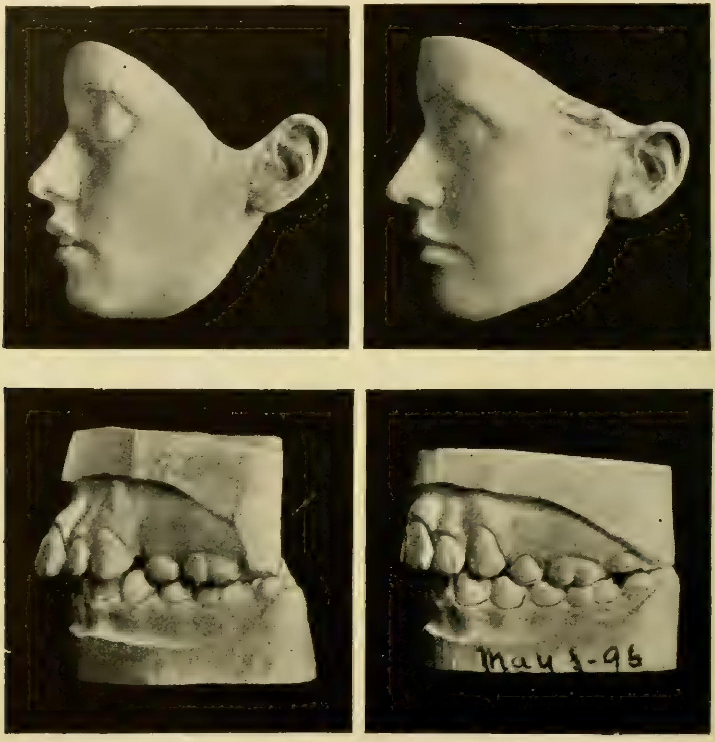
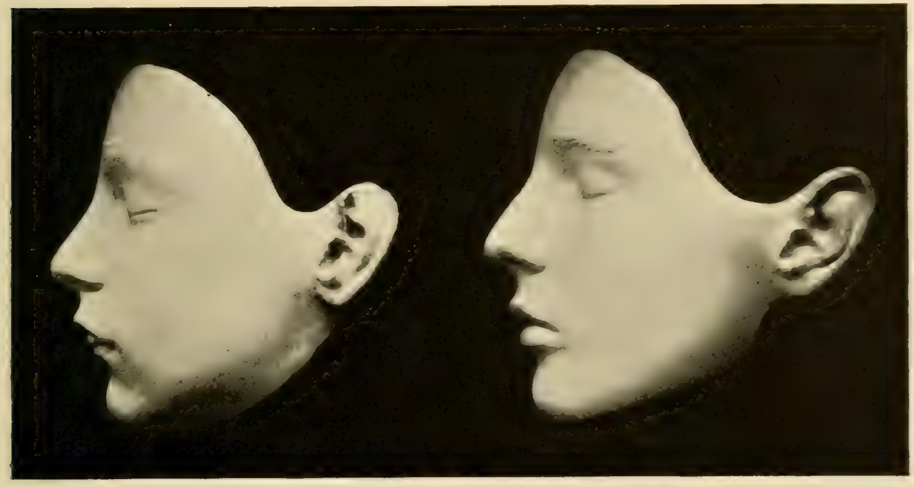


Fig. 7.

The *Seventh* (See Fig. 9) and last irregularity to which I shall call your attention, that we would be obliged to place in this so-called second class on account of the peculiar occlusion of the molars, is one form of that common irregularity that is characterized by labial mal-eruption of the cuspids. These conditions may be caused by the premature loss of the temporary teeth, permitting the bicuspids and molars to drift forward and finally jump a cusp, so as to completely close the space required for the permanent cuspids. Sometimes this movement will be fully the width of a bicuspid, and with no apparent reciprocal movement of the incisors.

Commonly the cuspid space is partially closed by the retrusion of the incisors—a movement that may be permitted by the lower teeth being crowded into a smaller arch and malposed. Again, it may be that the condition arises from an inherited upper protrusion which is prevented from assuming its usual form by the premature loss of the temporary cuspids, and the retrusion of the incisors, with little or no reciprocal movement of the back teeth.



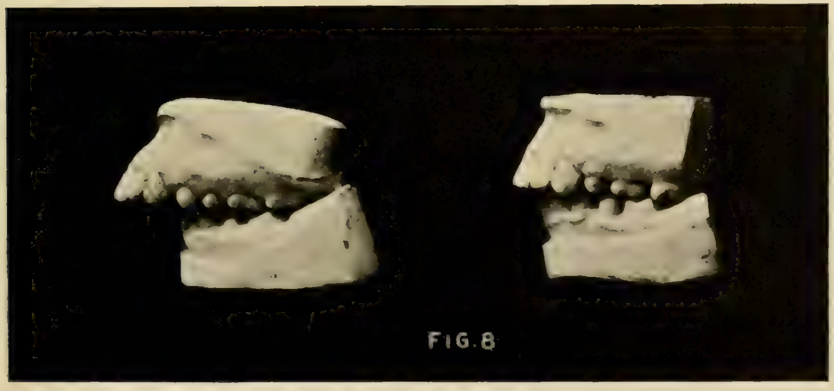


FIG. 8

If correction is attempted without extraction in this condition, as would be proper in nearly all other cases where this characteristic malposition of the cuspids occur, the back teeth would require to be retruded to a typically normal occlusion; otherwise there would be a proportional protrusion of the upper teeth when the cuspids were corrected. After the eruption of the second molars an attempt to retrude the buccal teeth would be a very questionable undertaking, especially if it was demanded that the entire movement should be confined to the uppers, as it certainly would, if the lower teeth and jaw were perfectly normal in their relations.

The diagnosis and prognosis of these cases is often very difficult, and can only be determined by a careful study of occlusion and dento-facial relations, together with a perfect appreciation of the developing influence of growth.

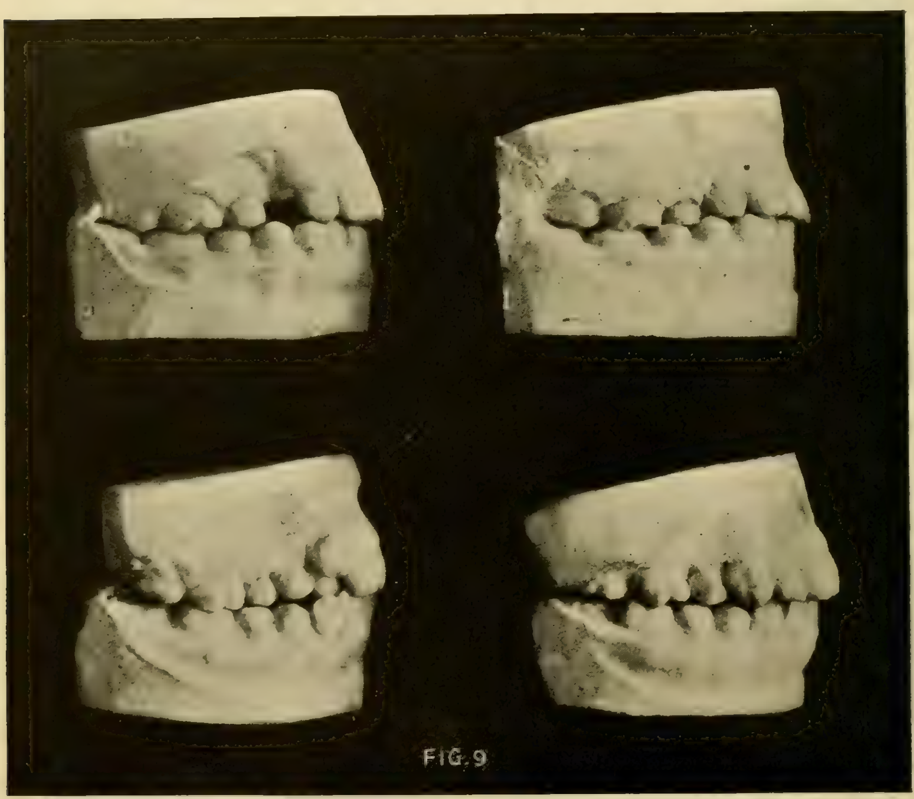


FIG. 9

In my classification, this character of irregularity constitutes a class to distinguish it from that most common and similar form which demands correction without extraction.

It will have been noticed in all the seven cases which I have presented, that the upper molars occlude mesially to normal in relation to the lower about the width of a bicuspid, and that the different distinct types of irregularity which may occur with this occlusion differ from each other in character and demands for correction, quite as much as it is possible for them to differ in these particulars from the several distinct types that occur when the occlusion of the molars is normal and also distal to normal in relation to the lowers.

Then why call them a class? It is certainly a very simple method of disposing of the classification of irregularities of the teeth, and one doubtless that will appeal to many because of that fact alone. But is it scientific? Is it useful? Do these particular signs of occlusion or malocclusion in themselves indicate the character of a certain irregularity, or the movement demanded for its correction? Certainly not, if the other two so-called classes are as misleading as the one I have shown; and I am sorry to say that they are when considered in the sense of a classification designed for teaching or practice.

Again I wish to say that the only object of this showing is to emphasize the importance of a classification of irregularities that is governed by the same rule that governs scientific classification in other sciences, viz.: one that is founded upon an experienced recognition of distinct recurring varieties which constitute the general forms or characteristics peculiar to the class. In orthopedic dentistry this would mean—an intelligent grouping in each class of recurring malpositions or dento-facial deformities that are distinctly peculiar to the class, and that require for their principal correction a similarity of movement.

In the classification which I propose and present for your consideration, irregularities of the teeth are first divided into two general divisions:

In the *first* division are placed simple and complex irregularities that are purely dental in character and which cannot be scientifically classified according to the above rule because of the fact that nearly every case is composed of two or more distinct varieties of malpositions.

In the *second* division are placed distinct types composed principally of dento-facial irregularities that are susceptible of being properly classified.

The *first* division includes by far the more common forms of irregularities; and while there is no case however apparently simple in which the type and peculiarities of the physiognomy should not be carefully and intelligently observed this division is supposed to contain only those strictly dental irregularities that produce no marked facial imperfection, and which if properly corrected without extraction or abnormal absence of any of the teeth will result in normal occlusion.

For teaching purposes I have divided them into five groups, according to the five distinct malpositions that require a similarity of movement and force appliances, as follows:

Division 1.—Simple and Complex Dental Irregularities.

Group I. Intrusions and Extrusions.

Group II. Labial and Lingual malalignments, including crowded complications.

Group III. Mal-turned Teeth.

Group IV. Contracted and Expanded Arches.

Group V. Wide inter-proximate spaces between Front Teeth.

By segregating the above malpositions, two or more of which might occur in any practical case of complex irregularity, I am able to show to the entire class, by lantern projections, the different malpositions which each group may assume, together with the appliances and peculiar force that is applicable for correction.

In the *second* division, or classified irregularities, the general malposition is distinctively characteristic of the class, or one of its variations; and while it may contain minor complications, the principal methods ot treatment will be the same in every case.

With the exception of Class 1st and 2d, they are divided according to the peculiar facial deformity or imperfection which the irregularity produces; and even with Class 1st and 2d, diagnosis with a view to treatment is dependent solely upon an intelligent consideration of the relations of the teeth to the physiognomy and the harmonizing influences of maxiliary and facial development.

Division 2.—Dento-Facial Irregularities.

Class I. Labial mal-eruption of the upper cuspids that demands correction without extraction.

Class II. Labial mal-eruption of the upper cuspids that demands extraction of bicuspids in correction.

Class III. Protrusion of the crowns of the upper front teeth.

Class V. Protrusion of the crown and retrusion of the roots of the upper front teeth.

Class VI. Protrusion of the roots of the upper front teeth, with occlusal zone normal or retruded.

Class VII. Protrusion of the upper teeth and retrusion of the lower.

Class VIII. Retrusion of the lower teeth and upper normal.

Class IX. Retrusion of the upper teeth and protrusion of the lower.

Class X. Retrusion of the upper teeth and lower normal.

Class XI. Full protrusion of the upper and lower teeth.

Class XII. Full retrusion of the upper and lower teeth.

Class XIII. Bodily protrusion of the lower teeth and jaw.

Class XIV. Bodily retrusion of the lower teeth and jaw.

Class XV. Open bite irregularities with various antero-posterior relations of the upper and lower teeth.

The large number of classes into which I have divided typified irregularities may lead one to infer, as a certain writer did in criticising Dr. Goddard's classification as compared to the three class scheme—that we proportionately increase the difficulties and complications of practice and teaching. The writer thought he could understand and practice orthodontia far more successfully with only three classes of irregularities, the characters of which could be easily distinguished by the simple occlusion of the first molars, than it would be possible with a classification that divided irregularities into a dozen or more classes, each one of which required for its recognition and treatment a complicated study of dental and facial relations. Such a person could also more readily understand and practice medicine if there were only three classes of diseases, which could at once be easily recognized by a simple and definite sign. But it happens that the sciences of medicine and dental orthopedia are not so accommodating.

If the different distinct types of irregularity of the teeth which I have shown, arise in practice, and if it be true that they cannot be properly classified or treated on the basis of occlusal relations, should not the student of our dental colleges whose curriculum includes orthodontia have a right to demand full and perfect instruction in this department?

By bringing together the same conditions that dentists have been treating since the practice of orthodontia began, and by separating them so as to place in each class a definite type that demands for its correction a certain movement or character of force that differs from all the others, we have endeavored to present a classification that will enable us to recognize these conditions and more clearly define, teach and practice orthopedic dentistry according to correct principles of science and art.

It does not make it any easier to be told that a protrusion of the upper front teeth and a retrusion of the lower teeth and other conditions more widely different, belong in the same class, to be treated by the same apparatus and character of force. It might serve to induce certain ones to undertake a difficult operation, but I doubt its simplifying influence to one who can appreciate perfection and who is striving for correct practice.

In arranging the sequence of the classes, I have endeavored to present them in the order of their relations; but there is no objection to interchanging, dividing or adding to the types, provided that the rules are preserved that should govern classification. In speaking of different types it is not expected that they will be defined as belonging to a certain class number without other qualification, unless for reference or abbreviation of that which is shown or understood, as this would involve memorizing the order of sequence.

In presenting the different classes with the view of teaching diagnosis and treatment, lantern slide projections of drawings which mechanically illustrate the character of the irregularity in its typical form, the occlusion, facial relations and effect are thrown on the screen; different views of the apparatus on the teeth, and finally disassembled and shown in parts. This is followed with lantern slide projections of the models of practical cases belonging to the class.

I have long believed that we will never arrive at the perfect teaching of orthopedic dentistry until text books are written relative to the practical technics of the work, that will enable us to present this portion of the didatic teaching in the form of recitations instead of the usual stereotyped lectures.

With the latter method the student comes to the class usually with no knowledge of the subject that is to be presented; and when he leaves he is more often than otherwise in a mystified condition of mind, so that the little knowledge he has gained will not stay with him long; and as it is impossible for more than a few to take intelligible notes of that which has to be taught with blackboard drawings, charts and lantern slides, relative to the various forms of irregularities and the construction and application of methods for their correction, the final result of our work on the candidate for graduation is something which we too often are obliged to simply close our eyes to.

With the method I propose, the student would be able to come to the class fully prepared to answer all questions relative to the character or characters of irregularity and their treatment that were selected for the hour, illustrations of which are thrown upon the screen.

If these are presented in a perfect sequence of arrangement, properly grouped and classified, the student is kept in intelligent touch with the teaching from the beginning to the end of the course.

During the progress of this portion of the course, the teacher can amplify the work with his individual experience in similar cases, or the methods of others which he believes to be more practical, and other knowledge of importance not mentioned in the text.

Orthodontia Technology.

By S. H. Guilford, D.D.S., Ph.D., Philadelphia, Pa.

In the teaching of orthodontia it is extremely important that we should have a correct understanding of certain principles involved and the practical application of such principles.

Extraction.

One of the questions that arise early in the course of our teaching is "Shall extraction be resorted to in our efforts to align a malposed set of teeth, and if so, under what conditions?"

It has generally been granted by those teaching and practicing orthodontia that in a rather limited number of cases extracting will often simplify and therefore expedite the operation without detracting from the beneficial results obtained.

But this theory, which has prevailed for a long time, and which seemed to be sanctioned by experience, has recently been attacked by certain men who contend that extraction need never be resorted to and that its practice in orthodontia is little less than a crime. Some even go so far as to assert that it is never productive of good and that in all cases it results in harm.

On this account it behooves us to consider the matter at this time in order to determine, if possible, which is the better course to pursue.

It is rather a broad question to ask, "Shall we extract, or shall we not?" for so much depends upon the condition to be corrected and upon the tooth or teeth which it is proposed to sacrifice.

In nearly all of the writings of the extremists who hold to the non-extraction doctrine it will be found that their contention is against the extraction of the permanent first molar.

This seems like begging the question, for I presume every one in this assembly recognizes the great importance of this particular tooth in the arch; its serving as a guide to the proper alignment of the other permanent teeth as they erupt; its important service in mastication during the changes accompanying second dentition, and the harmful results of its loss in allowing the other teeth to wander from their normal positions.

For these reasons and for the additional one that its extraction cannot assist in providing space for crowded teeth in the anterior part of the arch, none of us either advocates or practices the extraction of this tooth.

Neither would we sanction the extraction of any of the six anterior teeth in the upper arch for the reduction of irregularity in that region, but when it comes to the question of preserving all of the teeth and thereby having an undue prominence of the upper arch, or, the extraction of one or both first biscupids to provide space for bringing such teeth into alignment and thus avoiding protrusion I take it that nearly all would agree that the latter course is the better one to pursue.

In patients over fifteen years of age where the alignment and relation of both upper and lower teeth on one side of the arch are normal and where, on the other, either a lateral incisor or a cuspid has been crowded out of its normal position and where, in addition, the anterior teeth do not call for protrusion, would it not be in accordance with the dictates of wisdom and prudence to extract the first bicuspid to provide space, rather than to disturb the entire line from central to second molar in order to avoid extracting?

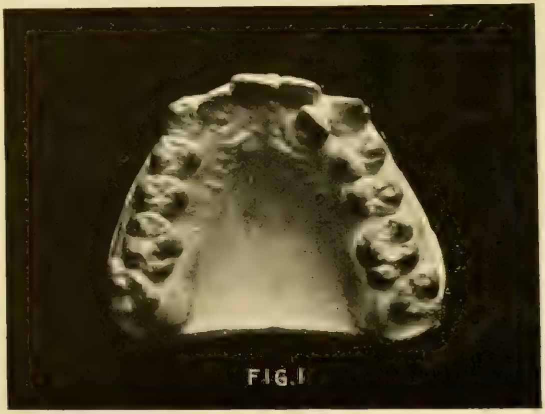


FIG. I

Is it advisable in a majority of cases to perform a simple operation or a complicated one, where the results can be made satisfactory by either?

The extremists claim that whenever extraction is resorted to there can never be an absolutely perfect alignment or relation between the upper and lower teeth.

This is certainly true but may we not, in many cases, after limited extraction, have a very good occlusion and one that will perfectly satisfy all the demands of mastication and probably those of appearance?

It is very well to strive after perfection but do we ever attain it?

I would not be misunderstood in regard to the matter of extraction for where it has been resorted to on a large scale or even injudiciously on a small scale the evils that have followed in its train have been almost numberless and very deplorable, but under certain conditions and within proper limitations I believe it to be entirely justifiable.

To teach students that extracing for correction should never be practiced would be simply leading them into a maze of difficulty and virtually inducing them to attempt complicated operations that would surely invite failure.

On the other hand to lead them to infer that it should be resorted to in many cases, or for the simple purpose of rendering operations less difficult would be doing them equal injustice.

The proper function of teaching should be to instruct students not only as to the How, but as to the When and Where.

In support of the position that extraction is, in some cases, not only justifiable but advisable I would ask you to look at the representation of two cases in each of which a first bicuspid has been extracted to correct an irregularity which would otherwise have involved long and difficult treatment, with, possibly, less satisfactory results.

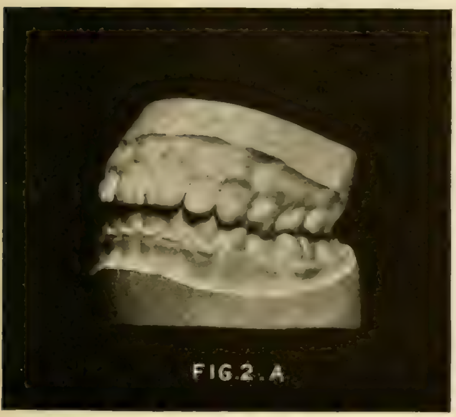


FIG. 2. A

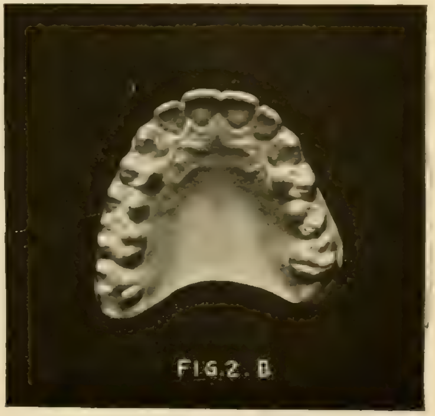


FIG. 2. B

Cases from Practice.

In Fig. 1 you will notice that on one side the teeth occlude fairly well while on the other side the lateral is malposed lingually and the cuspid buccally. Owing to this irregularity the upper and lower posterior teeth on that side are not in normal relation either before or after correction, and yet they occlude in such a way as to render perfectly satisfactory service in mastication.

As there was neither protrusion nor retrusion of the upper or lower anterior teeth, but instead, a normal relation, to avoid extraction in this case would have required the moving posteriorly of both bicuspids and molars. Would this have been a very difficult operation or otherwise, and if accomplished would the aesthetic improvement of the case have been sufficient to compensate for the time, difficulty and discomfort involved?

I leave it for you to answer.

Fig. II. A and B represents a case similar in many respects to Fig.

1. The original models are missing but they showed perfectly normal relation and occlusion on the right side, while on the left the lateral was misplaced lingually and the cuspid labially. The first molar on the left had been extracted before the case came to me, but by moving the bicuspids posteriorly space was created to enable the malposed teeth to be brought into position. Here a mistake had certainly been made in the extraction of the molar, and yet, as you will see, the result is satisfactory, for while the occlusion on that side is not strictly normal it is still sufficiently good for serviceable mastication.

I think that none of us would have advised the moving posteriorly of the second molar because it happened to nearly occupy the position of the first molar and then to have inserted a substitute for the missing first molar, and yet something analogous to such a procedure has been advocated in the journals.

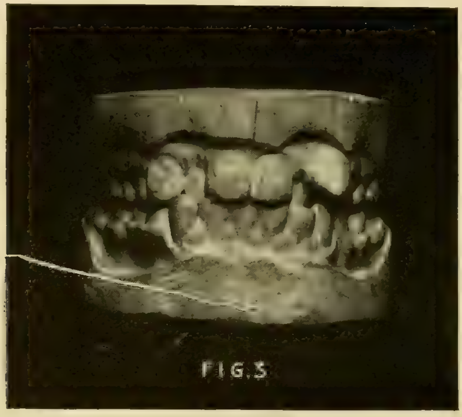


FIG.3

Fig. III shows models which were sent to me for advice. The child was said to be fifteen years old. As you will observe, both of the superior laterals are misplaced lingually and the left cuspid buccally. The median line is also slightly to the left of its normal position. The relation of the upper centrals and the lower incisors is so nearly normal as not to call for any material change. A slight movement labially of the superior centrals would allow the right lateral to be brought readily into alignment, but to provide sufficient space for bringing the left lateral and cuspid into position would require excessive protrusion of the incisors, the retraction of both bicuspids and molars or the extraction of the first bicuspids on that side.

Should we advise the extreme protrusion of the incisors or the retrusion of all the buccal teeth rather than the extraction of the first bicuspid? I should say, "No."

Fig. IV represents a case in which the superior first bicuspids were extracted eight years ago to afford room for bringing into alignment the lateral incisors which had erupted labially and were considerably turned upon their axes. The patient was then seventeen years of age. The centrals above were in proper relation with the lower incisors. The overbite was normal, and there was neither protrusion nor retrusion of any of the anterior teeth. The bicuspids and molars, however, owing to the opportunity offered by the misplaced laterals had moved forward the full width of a bicuspid.

In this case, the problem presented was that of moving backward all of the buccal teeth on each side, or the excessive protrusion of the anterior teeth or the extraction of the first bicuspids.

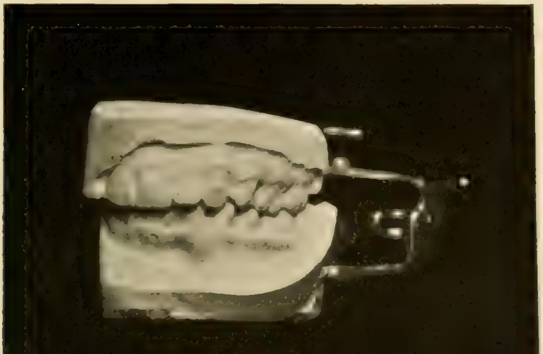


FIG. 4

To have protruded the anterior teeth would undoubtedly have created a deformity of the features; to have moved the buccal teeth backward would have been an Herculean task if not an impossibility at the patient's age. As you will see by the models I attempted neither but removed the first bicuspids instead and brought the laterals and cuspids into line.

The second bicuspids and both molars were not disturbed so that they remain in positions anterior to normal and yet observe how well the teeth interlock and how thoroughly efficient they are for purposes of mastication.

Besides this her features are in perfect harmony and I fail to see how they could have been further improved.

Occlusion.

The question of extraction is naturally very closely related to what is commonly known as occlusion, and before entering upon a consideration of this second phase of our subject let us pause for a moment to consider the appropriateness of the term, for teachers should be exact with regard to the terms they use if they wish their students to be able to express themselves properly. We claim to be teaching a science, but one of the great features of any science is a correct terminology.

Occlusion, when used in connection with a mechanical action means "a closing or shutting up."

Occlusion, in dental science means the closing or coming together of the teeth. When the upper and lower teeth are not in contact there can be no such thing as occlusion.

The teeth, if normally placed are in proper relation all of the twenty-four hours, but they are in occlusion probably less than one hour of that time. Why then speak of the occlusion of the teeth when we mean their relation to one another?

If the teeth are in normal position the occlusion cannot be otherwise than correct.

The relation of the teeth determines the occlusion, the occlusion determines nothing, for it is simply a coincident condition. As a term used to express the relation of the upper to the lower teeth it is faulty, and its employment is made more objectionable when we read in books and in print such expressions as "a cuspid erupting in labial occlusion" or "a lateral in lingual occlusion" when these teeth are not and cannot be in occlusion on account of their abnormal positions.

"Labial or lingual misplacement" would be a better term and "normal relation" is an expression which fully and correctly describes the teeth when they are in such positions as nature intended them to be.

Some recent writers have made the statement that the natural relation between the upper and lower teeth is determined by the position of the first molars above and below. That when these meet each other in a normal or natural manner the rest of the teeth must come into proper relation. In other words, they claim that the first molar is the key to a correct or incorrect relation of the other teeth.

Certainly if the teeth in one or both jaws are in normal position the first molars will be in proper relation to one another, but does it follow that because these two teeth occlude properly the others must likewise do so? I think not. Why take the first molar as a key? Goddard says that the lower second bicuspid is the "key to occlusion." Which shall we accept, the first molar or the lower second bicuspid? One is as near right as the other, in my opinion.

More than this, who will tell us when these teeth are in their proper or normal positions? Is it when the anterior buccal cusp of the upper occludes between the buccal cusps of the lower? So say the extremists, but it is a well known fact that in certain cases these teeth interdigitate normally when they are in an advance position as compared with those of some other jaw which also interdigitate normally.

To locate these teeth properly we should know definitely their real anatomical position. This could only be done with exactness by determining the distance that this tooth should be from the median line in front and the tuberosity behind. Has this been determined?

In view of this how can anyone lead himself to believe that the relation of the first molars necessarily determines the irregularity; that in any case of malposition the first thing to be done is to bring the molars into proper relation and that after this is accomplished the remainder ot the operation will be comparatively easy?

Retentive.

Another error has found lodgment in the minds of some of our profession, especially the younger portion. It is that when the upper and lower teeth have been brought into proper relation the interdigitation of the cusps of the bicuspids and molars will, of itself, prove sufficiently retentive to prevent subsequent displacement.

If the teeth were constantly in occlusion or if they were so for any considerable portion of the time, they would undoubtedly prove sufficiently retentive, but as they are so only at intervals and then mostly during the act of mastication this influence must necessarily be a very limited one. No, the buccal teeth themselves are kept in their normal relation not so much by their interdigitation as by the fact that they stand in a solid phalanx and that one cannot move without displacing the others which would almost be a physical impossibility. Besides, how can the proper relation of the buccal teeth influence the anterior ones in cases of protrusion?

When these anterior teeth are retruded will the normal relation of the buccal teeth keep them from again moving forward? Certainly not.

As teachers, it becomes our duty to see that the younger generation of practitioners do not imbibe erroneous ideas and that they are not led astray by false theories.

This matter of occlusion, or more properly, relation of the teeth, is of the greatest importance and we should have correct and scientific principles to govern us in its consideration. These principles are not new, they have been enunciated by all writers on orthodontia from Kingsley down. They simply need, at this particular time, to be sufficiently emphasized.

Firm Anchorage.

Suitable and positive anchorage for the movement of the teeth is a matter of the greatest importance, for a lack of knowledge concerning it has undoubtedly been the cause of many sad failures.

Time will not permit us to consider the many ways in which anchorage may be obtained in various cases but I desire to bring into prominence the basic principle involved in all.

The truth of the principle that "the point from which we exert force must greatly exceed in rigidity that of the object to be moved," is apparent to any one having even a rudimentary knowledge of dynamics and yet, strange to say, this principle often seems to be lost sight of in the devising of apparatus for the correction of irregularities.

Even though a multi-rooted tooth will offer far greater resistance to force applied than the majority of single-rooted ones, it is never safe, and hardly ever permissible to use a single tooth for anchorage.

The tipping or even slight movement of a tooth used as anchorage is not only a serious matter in itself, but it frequently complicates and sometimes absolutely negatives the good result sought to be attained.

Furthermore, there is no occasion for assuming the risk that is thus involved unless it be the desire to avoid the labor of special construction and employing instead the adjustable "clamp bands" or other "ready to wear" appliances for sale at the supply houses.

Parts of appliances of various forms and sizes are placed on sale and recommended as suitable and sufficient for all cases presenting, but a combination of parts such as are required for correct anchorage are not offered because such combinations cannot be made except for the case in hand. It is for this reason, probably, that the designers of the marketable products strive to find an excuse for single-tooth anchorage.

Even the use of a long tube to a single-tooth band (as somewhere suggested) will not entirely prevent the tipping of the tooth although it may measurably retard it.

When the anchorage is limited to one side of the arch as it usually is in the movement of an anterior tooth either forward or backward in the line of the arch, the combined resistance of both molars or a bicuspid and molar should be taken advantage of and even then greater firmness will be gained by placing the bands on alternate teeth, as for example, the second bicuspid and second molar. And where anchorage on both sides of the arch is required as in moving the anterior teeth "in phalanx" the same method is employed on each side.

Construction of Bands.

It is sometimes difficult, where the second molar has not erupted to its full extent to place a band upon it in connection with a similar band on the first molar or second bicuspid, but the exercise of a little ingenuity will usually overcome the difficulty.

With two posterior teeth banded and these bands connected by the long tube which is to accommodate the screw or bow-wire intended to exert its force upon the anterior teeth we secure as stable an anchorage as it is possible to obtain under the circumstances.

In the making and arrangement of bands which are to serve as the basis for the construction of anchorage appliances some operators construct them upon the plaster model, while others for the sake of greater accuracy, construct and fit them to the natural teeth while the patient is in the chair. One plan has the advantage of relegating part of the work to the laboratory and thus conserving the time of both practitioner and patient, while the other possesses the advantage of a more certain fit and greater accuracy.

Both of these advantages may be combined by the use of German silver bands made from seamless tubing drawn to various diameters and of varying gauge.

After taking the usual preliminary impression and deciding upon the teeth to be banded, unannealed bands of gauge 36 are selected of suitable size and forced over the teeth to remain until the following sitting. In the meantime, annealed bands of exactly the same size are fitted over the corresponding teeth on the plaster model and the further construction of the appliance proceeded with. The bands placed upon the natural teeth and forced between them and the adjoining ones will be found, by the second sitting, to have provided sufficient space, painlessly, for the placing in position of the operating appliance.

By this method time is saved, accuracy is obtained and the patient is freed from unnecessary annoyance.

Samples of these bands, fitted to the teeth and connected by tubing are shown on the dummy jaw herewith presented.

Discussions of Papers by Drs. Case and Guilford.

Dr. A. E. Webster, Toronto, Ont.

To discuss a paper such as the one read by Dr. Case is a privilege. It conveys a complete idea of the points to be considered in a course in orthodontia. As a pupil of Dr. Case, and as a close observer of his methods, I have nothing to say that is not commendatory of what he has done for orthodontia. It must be those who make a specialty of any department of dentistry to whom we must look for advancement; but we must look to those who do not practice specialties for the learning. There is always the danger of a specialist being carried away with a notion of the over-importance of his subject. While this may apply to some of those who are practicing orthodontia as a specialty, it can in no sense apply to the essayist.

I am in perfect accord with the four propositions set forth by the essayist in introducing the subject. As little time as possible should be spent on the manufacture of stock materials. It will suffice to familiarize the student with their main characteristics. It is much more important for a student to acquire manipulative dexterity while making something useful, than in doing dummy work. It gives his work interest. For the past four years orthodontia technic has been taught in the Royal College of Dental Surgeons, in the manner outlined by Dr. Case, making such modifications as the conditions of the curriculum of the college demands. The results have been fairly satisfactory, but not all that could be desired. There is no fault in the general plan, but with the present manufacturers it is impossible to carry it out. As stated, the foundation principle of comfortably carrying out any method of teaching this subject, is a uniform system of measurement, and then to have the partially prepared materials made to suit these conditions. Up to the present time I have found no satisfactory screw plate. The holes are not uniform in size, the threads are not always well cut, nor of the same number of threads to the inch. There are no draw plates with the proper sized holes to correspond with the screw plates. And even if they were made so, they would soon wear by use until they would not correspond. Any tap blanks and drills we have been able to get are so variable in size that they are an eternal nuisance. One almost slips through the screw plate without cutting a thread, while the next one will not enter at all. The square tubing for nuts has such a large hole in it, that the smaller sized nuts cannot be made from it. If these and other difficulties of detail could be overcome, it would be a pleasure to teach orthodontia technic as outlined. It is the exactness in detail that leads to success in this subject more than in any other department of dentistry. When these partially prepared stock materials are accurately prepared the greatest difficulty in teaching orthodontia technic shall have passed away.

Terminology.

I agree with the essayist that there should be a uniform nomenclature and a much more comprehensive and accurate one than has been in use. There are many malpositions of teeth that cannot be accurately described without a cumbersome circumlocution, and there are words borrowed from other departments of dentistry, that do not convey an accurate idea. While the essayist has carefully defined some words, he has in other cases attacked words which express a definite position of a tooth, or number of teeth. If there be an objection to saying that a tooth is in "mesial occlusion" how better is it to say "anterior relation." Anterior relation to what? They must be anterior to something. If normal is meant, why not then say, mesial to normal. The difficulty is quite clear to anyone who has ever attempted to analyze these terms, and the classifications made in our modern texts. But the substitution of anterior and posterior for mesial and distal, does not get out of the difficulty. All of these terms express relation and the whole difficulty can be gotten around by basing the classification of irregularities and the positions of the teeth on the physiognomy. For example: There are normal profiles, there are protrusion and there are retrusions. This brings me to the classification, but before discussing that let me say, that there is a serious objection to saying mesial occlusion, or lingual occlusion, or labial occlusion. But there can be no objection to saying mesial position, or lingual position, or labial position.

I may start out with the statement that I am not in accord with any classification of irregularities that I have ever seen; not even the one in use in our own college. But I must say for it, that there are fewer objections to it than to some others. The status of any subject can be judged by the accuracy and completeness of its classifications. Thousands of pages of more or less useful literature were written on orthodontia before any classification was ever attempted. As the knowledge of the subject advances, so will the classification. The putting of names on certain existing conditions, is like naming holes on a golf course. The name should be based on some characteristic of the condition. Classifications of diseases in general medicine are based on anatomical locations, pathological manifestations, etiological factors, symptomatology and only very rarely upon treatment. Any classification which is partly based upon anatomy, and partly on symptoms and partly on treatment is not logical. The whole of any classification should be based on the anatomy or on the pathology, or whatever masis is chosen. To base a classification on treatment, is surely not scientific, or to criticize another classification because all the irregularities in one class are not corrected by the same force or appliance, is far wide of good criticism. We know quite well that the treatment for malaria is quinine, and yet it would hardly do to class this as a disease, simply because quinine will cure it. Classifications should be made having in view the etiology and pathology. And until something is known of the etiology of irregularities no acceptable classification will ever be made. A classification based upon the pathology alone does not suggest the treatment, while if based on the etiology the treatment is suggested.

Normal.
Protrusion. Retrusion.
Apical. Incisal.

The classification presented by the author is simply naming conditions as they present; to make it comprehensible it might be well to divide facial deformities into protrusion and retrusion, each with the modification of apical and incisal protrusion or retrusion. While Dr. Case's classification can be studied out, yet it can be more easily understood if they were extensions of an original type. The objection in chief is the basing on treatment and not showing the relation one bears to another. The classification which Dr. Case combats in his article is perhaps as defective as it is possible to be.

I quite agree that there should be a text book on orthodontia, written in a way that certain conditions might be carefully read before a lecture is delivered on the subject.

Dr. Guilford's Paper.

In Dr. Guilford's paper there is a plea for the teaching of correct principles; no more useful plea could be set forth. Perhaps fully seventy-five per cent of all cases of orthodontia attempted might about as well have been left alone. The difficulty is that correct principles are understood by only a few who practice orthodontia. What are correct principles in extraction, for example? There are those who live and teach even in the year one thousand nine hundred and three, that the first molars should be extracted, to correct deformitites in the anterior part of the mouth. Some advocate symmetrical extraction. These were thought to be correct principles years ago, but not so now. Unfortunately orthodontia is not yet on a scientific basis. It is always this or that man's practice that is being discussed, the subject or the principles of orthodontia are only incidental to the discussion. To illustrate, in America the disciples of Jack would not use anything except spring wires, those of Angle, the clamp band and the outside bar. There are those again who see no good in either bands, nuts, screws or springs; the plate is the only thing. It will take years to sift out the best from all these.

How can correct principles be taught when we do not know the causes which lead to the deformity? Do we really understand what forces direct the teeth into their normal positions and retain them? But vaguely, I think. Then how can we know the cause of even the simplest case of deformity, much less how to treat them; and to treat a disease without knowing the cause is mere imposition. I once heard a prominent teacher of orthodontia say, that he did not care a whit about the cause of a deformity, all he was concerned about was its correction. Such ideas are contrary to good teaching. In proportion as the normal condition is understood, so will the abnormal be recognized and in proportion as the cause of the abnormal is understood so will the treatment be successful, and normal occlusion obtained. The correct principles underlying the extraction of teeth cannot be understood unless there is a thorough comprehension of the normal physiognomy, normal antagonism of the teeth and what forces and conditions cause a normal development, and what forces an abnormal development. The teacher of orthodontia who spends his time in the discussion of an appliance for every deformity and but lightly reviews the anatomy, histology, physiology and principles of applied dynamics, has missed his opportunity.

In both papers just read the taking of the first molars and the cuspids as guides has been criticised and perhaps rightly, if taken as sole guides to correct occlusion, but improperly if only taken as suggested guides. Few dentists know what tooth occludes with certain others, while if a starting point is taken as suggested by Dr. Angle, it is simplified. I have found the suggestion of great assistance in teaching, but of little value in its extreme.

In closing I desire to say that the criticism of the term occlusion, as used by some authorities, is well taken, also the criticism of "Ready to wear appliances."

Dr. H. A. Pullen, Buffalo, N. Y. The subject of Orthodontia Technology as presented to us this evening by Dr. Case, is one of special importance to the teacher and practitioner at the present moment when the science of orthodontia is making such rapid progress that its perspective is only visible to the few who have given it special study and along certain definite lines.

There is only one section of this paper which I am going to discuss to any extent, and that deals with the classification of irregularities, and it brings up the question as to what we shall teach as of more mometary importance than how we shall teach.

The essayist asks you to adopt his scheme of classification without question as to its comparative excellence. Would it not be wise to argue the matter pro and con before deciding this question which is one of vital importance, and which deals with the foundation principles of this science, according to our present knowledge of the same?

A few years ago, there appeared upon the orthodontia firmament a radiant star, which at first startled us by its brilliancy and grandeur, but which, as we studied and observed its splendor, gradually illuminated our horizon, and shed its beneficent rays upon a grateful science, which so developed and improved in a short time that the star was considered an absolute necessity for its existence, and further advancement.

Occlusion.

Gentlemen, that star was the theory of occlusion in all its relations to orthodontia, as discovered by Dr. E. H. Angle, and it will stand as a monument to his untiring efforts for the advancement of orthodontia for all time.

The advocates of occlusion make all their deductions from an ideal condition of normal occlusion, which condition, though a temporary one, we grant, is yet sufficiently permanent to account for the normal eruption of the permanent teeth through the influence of the inclined planes of the cusps of erupting antagonizing teeth; sufficiently permanent to account for normal interdigitation and interlocking of cusps of the permanent teeth through interdependence of the arches of teeth, sufficiently permanent to be an integral and important factor in the laws of articulation as given us by the late Dr. Bonwill, and which are now taught in every college in the land; sufficiently permanent for the unaided retention of the normal position of certain simple irregularities which have been corrected; sufficiently permanent to warrant the founding of a classification of irregularities of the teeth from the variations from this normal condition. By it diagnosis and prognosis are rendered more accurate and scientific than by any other method; yes, and our experience justifies us in granting it sufficient permanence so that restoration of these ideal conditions by proper treatment restores the ideal facial lines when faulty on account of malocclusion.

Normal occlusion is a condition of perfect relationship existing between the normally formed and aligned teeth of normal dental and alveolar arches of maxilla and mandible, when in antagonism, the mandible being in its farthest posterior position and in perfect median register with the maxilla, and both in normal relationship with contiguous tissues.

Such a condition precludes abnormal relationship of contiguous tissues, such as over or under developed alveolar or maxillary zones, or maxillary or mandibular protrusions or retrusions, and in its most pefect conception can only be seen in a perfect anatomical subject.

The facial lines are dependent upon the normal occlusion for their normal relationship, hence, the occlusion is the factor of prime importance rather than the facial lines.

In the three-class scheme of classification, the facial lines are only symptoms of each class, being variable in the first class, and of a certain more definite and recurrent type in the second and third classes.

Shall we diagnose a case of irregularity from symptoms which disappear upon proper treatment of the occlusal relations of the teeth?

We would have it understood that normal occlusion is incompatible with any degree of irregularity, and that with this ideal relationship, normal occlusion and normal facial lines are inseparable.

In the diagnosis of any case of malocclusion, the occlusion is first noted, and then the variation of the facial lines from the normal, and in every case the variation of the facial lines from the normal is considered as caused by a variation from normal occlusion, and is, therefore, a symptom of faulty occlusion.

Classification, dependent on variation from normal occlusion, more than answers our requirements in diagnosis for the majority of cases, which are typical of the class to which they belong.

In the cases in which the essayist has extracted, I think that more ideal results could have been obtained, both as to facial contours and occlusal relations by saving all of the teeth and adjusting the occlusion to normal conditions.

Extraction.

The pictures thrown upon the screen are not convincing to my mind that a case of Class II (Angle's classification), for example, of distal occlusion of the lower arch, is not amenable to the treatment for the class, of restoration of normal occlusion, preserving, of course, the full complement of teeth, at the same time restoring normal facial lines, and using a simple appliance, the arch and clamp bands as used in the Baker anchorage.

This is in marked contradiction to the results obtained by the essayist, who has left the lower jaw in its posterior position, extracted upper bicuspids, and not improved the facial lines by the operation to the extent he might have done by more conservative treatment.

The paper presents no basic principles, from which deductions as to diagnosis and treatment may be made. Occlusion as a basic principle has been entirely ignored.

Deductions made from any other basis than that of occlusion are unscientific and unreliable. Occlusion is the prime factor for consideration in every step in orthodontia, in etiology, diagnosis, prognosis and treatment.

In the treatment of Class II (distal occlusion), restoration of normal occlusion is usually brought about by changing the occlusal relations of all of the teeth of both arches, moving the lower teeth forward and the upper teeth backward, at the same time changing abnormally shaped arches to normal. This operation, performed either unilaterally or bilaterally, as indicated, is different from that of jumping the bite and much to be preferred.

The retrusion of the lower jaw is a type of case of very common occurrence in my practice, and I do not feel justified in simply extracting the first bicuspids and forcing the upper anterior teeth back beyond their normal position, and leaving the lower jaw in its abnormal pose.

Extraction is the exception to the rule, and seldom resorted to in the treatment of any of the three classes of malocclusion.

Classification.

The classification according to occlusion has come to stay and it is only a question of time, when it will be accepted by all those who are working for the upbuilding of this benevolent science.

In answer to correspondence with the author of the theory of occlusion regarding Dr. Case's classification as proposed in the essay this evening, he has this to say: "Think of dividing malocclusion into some twenty different classes! Why classify it at all? Why not leave it in chaos? for this is not much better? And then, too, think of twenty different classes without once mentioning occlusion! How is that for a scientific classification, when we know that occlusion is not only the very basis of orthodontia, but of all dentistry, and that every operation in dentistry has a bearing on occlusion." It seems to me that Dr. Case is attempting to classify the superficial symptoms rather than the fundamentals. It is apparent that he does not understand my classification, and I am constrained to believe that he does not appreciate the simple principles of normal occlusion.

In reality it is not my classification. It is Nature's. I have simply pointed out the classes, divisions and subdivisions in which Nature arranges the teeth in malocclusion. These classes are not arbitrary nor new. They have always existed, and always will exist as long as man suffers from malocclusion, and these different classes, divisions and subdivisions may be renamed and rearranged, but what they are called would not or could not make any difference in the actual conditions existing.

I believe the teachers, and certainly, the students of orthodontia, who familiarize themselves with these conditions, will not only find out that it is the natural grouping, but will derive from it great comfort in the diagnosing and treatment of their cases. Since recognizing the principles in this classification of malocclusion, my own practice has been immeasurably simplified. "In art—in all things, the supreme excellence is simplicity." If anyone shall give us a better classification than the standard one now existing, no one would be more pleased nor more heartily welcome it than myself, but until that time I am quite content to leave the whole matter in the hands of the thoughtful, conscientious students of orthodontia."

Dr. Guilford's Paper.

It is very evident from the reading of Dr. Guilford's paper that he also does not consider occlusion in its proper light nor give it the importance it deserves or he would not have asked under what condition it was advisable to extract, nor would he have committed the error of extracting in some of the cases which he has shown us, where it was certainly contraindicated, according to our present knowledge of the demands of occlusion. However, there are cases in which extraction is advisable, as even an extremist will admit, but only where the demands of occlusion sanction it, where an improved rather than an ideal occlusion seems called for. Nor can a set rule for these cases which shall be inclusive of all conditions be formulated, because of such factors as the condition of the teeth themselves, peculiarities of occlusion, the temperament of the individual, etc.

I have already intimated that the occlusion was of sufficient duration to account for cusp influence in all its bearings on occlusion, and I cannot be persuaded that its influence is so momentary as to "determine nothing" as the essayist indicates.

"Relation of the teeth" is not a synonymous term, for the teeth are related in all positions of articulation, but they are not in occlusion except in one position, which I have already explained.

It is true that we have expanded the term "occlusion" to include relation as well as position of the teeth while in occlusion. A better term has not been suggested, and I believe the term "occlusion" will stand on its merits.

The essayist himself has some difficulty to dispose of the term in his paper, for he speaks of "the first molars occluding normally," where it is certain he meant the normal relationship of the teeth.

Dr. Guilford has again misunderstood the meaning of the expression "key to occlusion," as related to the first molars. The extremists, as he calls them, mean by this that only with the first molars in normal occlusion and relation, is the normal occlusion of the other teeth possible, referring especially to the antero-posterior or mesio-distal relationship.

Again, I cannot agree with the essayist in his ideas on single tooth anchorage. In hundreds of cases in which the first molars alone were used for anchorage, no harm has as yet resulted in a single case, and although it is advisable to use re-enforced anchorage in many cases, the first or second molars or even the second bicuspid may be used for anchorage for the majority of cases, for the attachment of buccal arches.

In both of the papers presented, occlusion in its proper sense has not been recognized. Occlusion is not an impractical nor is it an inapplicable basis for its importance is understood and its benefits appreciated by a large number of thoughtful, studious and unbiased practitioners.

In my own practice of orthodontia as a specialty, occlusion is the one consideration without which I would be at sea in diagnosis and treatment, and would consider myself entirely ignorant of orthodontia as a science with a scientific base.

If occlusion were of no value, the specialist who has had practical experience with it in diagnosing and treating cases would be the first to discredit it, but those who do understand the theory and practice of orthodontia from the basis of occlusion have nothing but praise and commendation for it, recognizing that the science has been placed upon a higher plane than ever before through its use, and that the benefits to humanity have been multiplied manifold.

Is it wise to leave it out of the college teaching?

In this discussion, I realize my inability to more than state the advantages to be derived from the adoption of occlusion as to the basis of the science of orthodontia.

The preponderance of evidence in favor of the theory as the chief consideration in the management of any case of malocclusion, must lie in the results obtained through its use, and I can only recommend to your observation and criticism, the esthetic results in restoration of normal occlusion and normal facial lines obtained by the earnest advocates of occlusion, as their clinics and practical work along this line shall be brought to your attention, in your societies or in the columns of the dental journals.

Dr. R. H. Hofheinz,
Rochester, N. Y.

The question of nomenclature reminds me of a story told of Bismarck who said that each German ought to have his own king. After listening to the discussion I feel that each dentist ought to have his own nomenclature.

I do not agree with Dr. Webster in regard to the lack of principles in orthodontia. He said that we do not understand principles as yet; that usually we are discussing methods. It seems to me, however, that we understand the principles pretty well, but that there is a great discrepancy as to the methods to be used. I think that we understand the question of occlusion; the pathologic changes that take place in the peridental membrane; and also the teeth in malocclusion. What interests me is this: Dr. Case remarked that there are fifteen different methods by which you can rotate teeth. Now, which of these many methods would Dr. Case teach his students in the orthodontia department? Is it advisable to teach them the general technique, or is it better to give them a special method? It is unfortunate that we have not with us to-night more men who advocate different methods. In this particular field we have the method of Case, Jackson, Angle and others. Would it be advisable to chose one method for teaching, or would it be better to teach a general method embodying the principles of treatment for these conditions?

In connection with the question of a four years' course—if there is any one department in the college that requires more time for teaching than is given to it to-day, it is the department of orthodontia. Whilst it is possible to teach the students the proper technique of making an apparatus in a short time, yet the philosophy of orthodontia can only be taught after a thorough understanding of the anatomical relations and of the scientific side of dentistry. And that should be taken up in the fourth year of the course.

Dr. J. B. Littig, New York City.

My method of teaching this subject includes the projection upon the screen of the methods of each individual who has had success in regulating teeth, as far as I am able to obtain diagrams. I then criticise each and show how an operation may be done by other methods. I go through the whole series of irregularities, giving the cause of each as I understand it. It is very difficult to say just what is the etiology in many of these conditions, and I doubt whether anyone does fully understand it. We have classifications which do, in a measure, comprehend what we should present to the students.

It is very difficult to illustrate all these methods on practical cases because the student to whom a case is assigned, may graduate before his work is completed or the patient grows tired of coming to the infirmary and drifts away, so that the student may not get the full benefit of his work. Therefore, the best way is to do the practical work as simply and as quickly as possible, and we must be governed in our teaching accordingly. I tell my students what I would do if I had a certain case in my office, but under the circumstances, when we do not know how long patients will submit to treatment, it is better to do something that will correct the trouble as quickly as possible in order that they can be discharged promptly.

Sometimes, in our own practices, we have to depend upon the character and appreciation of the patient. I am reminded very much in this connection of a maid that was sent to me by a patient with the request that my assistant clean her teeth; my assistant happened to be busy and I free and I said I would attend her myself. I cleaned them and put them in good order; but imagine my surprise when upon examining her teeth in the mirror, she said: "But, you have made them look like false teeth." A similar lack of appreciation is just what we have to contend with in orthodontia. In some cases we can regulate without extracting, taking from eighteen months to two years for the work, whereas in others we must extract so that the work may be completed in a very short time.

Dr. N. S. Hoff, Ann Arbor, Mich.

All that has been presented to us has been very good. This is the first time that I have heard Dr. Case make a classification of his work, but I am not prepared to sanction it, because I do not understand it. He passed over his models and appliances too rapidly.

This question of teaching technique is one that we ought not to overlook. Possibly we have been teaching too much technique. Some of us confine the technique to one system, while others spread it out over every system. In my opinion none of these methods is ideal, but a certain amount of that work must be done because of its value in teaching and developing manual dexterity. As to what shall be presented by the lecture method, and how, that is a matter each teacher will have to decide for himself. I like the Angle system and classification. It is simple, easily understood and definite. Students comprehend it quickly and they can utilize it, and for that reason it commends itself.

There is another method of teaching this subject that has not been mentioned, and that is the orthodontia clinic. There is nothing that will drive home the lessons of orthodontia so profoundly as a clinic. I do not mean that the teacher should do the work for the patient, but that the students, under the teacher's supervision, should do the work and carry the case to its completion. In this way students will learn the principles of orthodontia very much better than they can from the technique course, or from demonstration on models and appliances, or a didactic course.

Dr. Ellison Hillyer, Brooklyn, N. Y.

I hope Dr. Case will answer all the questions that Dr. Hofheinz asked. There are different methods of performing operations, and it seems impossible to teach the various technique in every case. I would like to know how Dr. Case would unify all methods and merge into one general system for student instruction, and whether he would have such instruction carried out on a line with the recitation from the textbook *at the same time.*

Dr. Case. Occlusion.

My classification met with about the reception that I looked for from the adherents of the three class scheme. One would judge from Dr. Pullen's remarks that I had attacked the great principles of occlusion and their importance as a factor in the correction of irregularities of the teeth. Nothing was further from my intentions as my paper will show. The reference that it makes to occlusion is to show that it cannot be used as a basis or guide for determining the character of an irregularity, nor in any sense to indicate the treatment that should be used for its correction. And I think that I have proven conclusively, by the illustrations I presented, that this is a fact.

In the correcting of all irregularities of the teeth with the view to their permanent retention, occlusion is one of the most important factors for consideration in diagnosis and prognosis.

In every case where the masticating teeth have established a fixed occluding position with cusps that interlock or interdigitate, whether it be typically normal in its relations or not, any change of that position necessary for the accomplishment of correction should place them in a new occlusal position of self-fixation, else nature, either in her forceful efforts to perfect the function of mastication, or in response to the law of inheritance, will mar or wholly destroy the perfect results of treatment, even though they be artificially retained for years.

In cases where one or more teeth of either jaw are crowded out of the arch alignment, or are abnormally turned and overlapping, if held in that position by the fixed occlusion of other teeth, any movement to accommodate them that is destined to affect the relative positions of the bicuspids or molars will usually require a concomitant movement of the occluding teeth of the opposite jaw.

In a large proportion of cases, and especially those which appear in the simple and complex groups, the relative size and general relation of the jaw bones are in perfect harmony with the stage of their development, or sufficiently so to make the rule imperative, that we strive to produce a typically normal occlusion—an attainment that is impossible where teeth are extracted merely to simplify the operation, or under a mistaken impression that regulation cannot otherwise be accomplished.

Extraction.

This does not mean that the principal and only object in practice is to attain to the production of a typically normal occlusion at the expense of producing or retaining a facial deformity; and especially when by the extraction of the first or second bicuspids we can place the operation within sure and easy possibilities of correcting the facial deformity, and leave the patient with a good masticating occlusion—often so perfect that only an expert is able to discover that teeth are missing.

In the contemplation of obtaining room for the correction of malposed teeth, or for the freer eruption of the permanent teeth, by the expansion of an immature arch or by the extraction of the temporary or permanent teeth, the harmonizing influences of growth with the natural enlargement of the alveolar arches should never be lost sight of. If dentists would give more thought to this subject and to the possibilities of judiciously enlarging the arches in keeping with the present and future development of other parts, there would not be that ruthless and uncalled for interference and that wholesale malpractice of extraction that now disgraces the science of Orthopedic Dentistry.

With modern methods and principles of applying force to the teeth, the dental arches can always be sufficiently and harmoniously enlarged—at both the occlusal and apical zones if required—to place malposed ones in perfect alignment. Therefore that phase of the question should never arise as an obstruction to correction without extraction. But the principal question which should be considered under these circumstances is: Does the present condition, or will the future development, of facial contours demand or permit, such an expansion, with a concomitant movement of opposing teeth, if necessary, to perfect the final occlusion.

In the old methods of enlarging the dental arch with plates, etc., and even with some modern appliances, the arches were always expanded laterally with little or no thought to the possibilities of the far more important distal movement of the bicuspids and molars, which is frequently demanded to restore them to the position from which they may have drifted and which nature intended they should occupy, to prevent the front teeth from being proportionately protruded.

It, however, is not advisable, after the erupting of the second molars, to attempt an extensive distal movement of back teeth that have not been moved forward by natural or artificial forces. Nor is it advisable to laterally expand arches to a width that is more than relatively normal, with the frequent production of an unnatural exposure of back teeth at every movement of the risorius muscles, that are sometimes seen from the hands of dentists who believe that extraction is never demanded nor required. To assert this, is to deny the influences of admixture of the types of different nations and races, which, through the laws of inheritance and variation, have produced the great variety of physical forms that especially are found in America where these causes have had full sway.

Classification. In regard to my classification, I can see no objection—in fact only good—in dividing irregularities of the teeth into as many classes as there are distinctive recurring irregularities that differ in their principal characteristics and demands of treatment from other recurring irregularities.

This question must surely resolve itself and be guided to its solution by actual conditions that we meet. If these actual conditions become familiar as distinct varieties of irregularities which differ from each other both as to character of inharmony that they produce, and the treatment demanded for their correction, it must certainly constitute a class according to every scientific law of classification. When dentists are able to recognize these different distinct varieties by the special inharmony or deformity which they produce, and when we are able to instill them into the minds of our students, they will then—and not till then—be able to outline and follow the proper course of treatment which the case demands for its most perfect correction.

Dr. Guilford. I think what Dr. Hofheinz meant to ask was, whether in teaching orthodontia we taught the different methods advocated by different men. For myself I can answer. We have had many systems that have become so entirely obsolete that they are matters of history only, although some of them possessed certain virtues, and in my teaching I always refer to this fact.

With regard to the appliances: If a student knows how to draw a wire, how to make tubing and how to make a nut, he has all the requirements that he needs if he knows what he wants to construct. Those are the fundamental things he must know. He must also know what to do in certain cases, and to learn this he must have, in addition to the didactic teaching, clinical instruction. Students bring me cases for examination, and I have them make models and present them to me. That gives them practice in making models. Then I look over the model with them and ask what they would do in that particular case. After I have their opinion I tell them that this requires work of a certain character which can be done in this way or that way or some other way. Now, what plan shall we pursue? I discuss the various methods that I have outlined, stating the advantages and disadvantages of each, until I finally decide on what ought to be done. Then I tell them to go ahead, make the appliances and treat that particular case. I do not think that much stress should be laid on the teaching of systems because the tools and appliances we use are as old as the hills and do not belong to anyone. They are the foundation of the devices which we wish to construct, and if the student knows how to make them, and what course of treatment to pursue, there ought to be no very great difficulty about the matter.

Methods of Teaching the Anatomical Arrangement of the Teeth.

By B. J. Cigrand, M.S., D.D.S.

This is an age of the practical, and the trend of the times is towards the serviceable and comfortable. Theory and speculation are necessary attributes to progress, but the basic element always remains centered in the practical.

The ancient Spartan king, Agesilaus, when asked what things boys should learn, replied: "Those things which they will practice when they become men." This remark expresses a truth which is as forceful today as at any time of the world's history; in fact, in these days when labor-saving devices and time-saving ideas shape the destinies of individuals, the practical becomes a most potent factor.

Prosthetic dentistry, like any of the other arts or sciences which has a sub-structure—mechanics—advances in theory only, when that theory bears successful results in practice. In its two-fold evolution it absorbs from every available source which tends to broaden its art or perfect its science, in consequence of which, it calls to its aid, all the kindred professions.

The Mechanics of Mastication.

The study of mastication is one which is of greatest possible concern to both the operative and prosthetic dentist, since assurance of success is only possible when a complete mastery of the subject of mastication is reached, and this happy era has not yet arrived.

Of course we owe the inceptive thought of perfect artificial mastication to Dr. Bonwill, of Philadelphia, though he was much in error as regards many of the masticatory principles; still in a number of important points he was correct, and he deserves much credit for having directed our attention to the careless and non-anatomical manner in which the artificial dentures were being constructed. Notwithstanding the fact that close observation demonstrates that his theories on crucial points was incorrect, we must remember him as the great advocate of normal masticatory arrangement.

It would be of great interest to recite the progress that anatomists have made in their study of the mechanism of mastication, but sufficient is the statement that for two hundred years the medical and dental practitioners have been struggling with the problem and are gradually conceiving the principles which govern this divine ordination.

Artificial dentures as generally constructed are decidedly abortive and do not thoroughly fulfill the purpose for which they are intended, and the time is coming when the old-time ginglymoid articulator will claim the same consideration in prosthetics that the turnkey holds in oral surgery. It will be a thing of the past and serve simply as a milestone in the evolution of dentistry.

There can be little doubt as regards the inefficiency of the artificial denture which admits of only ginglymoid movement, since this mere hinge movement is not in accord with nature. Disregard for normal or perfect mastication has led the practitioners to grow indifferent to nature, and the result is that the public pays the penalty of violation of nature's laws.

Many practitioners offer as an argument that the patients do not appreciate the true worth of teeth constructed to allow accurate jaw movements; besides the same dentists claim the time devoted to so laborious a task is not sufficiently compensated. To the first objection I would say, if the dentist will instruct his patients in the science of normal mastication, incidentally pointing out the value of lateral movement, the patient will ardently accept his judgment as deserving recognition.

The Articulator.

Those who anticipate an instrument in the form of an articulator which will make occlusion and articulation in artificial substitutes positive and certain in every case are certainly harboring in their minds a delusion. Our professional work is such that, no matter how carefully we mount our artificial dentures, we must always construct trial plates, make changes and even after the case is soldered or vulcanized we must carve and alter the occlusal surfaces until in the mouth we get perfect results. This art side of dentistry can never be eliminated. It stamps us as something more than mechanics, in that we cannot always follow set rules or depend on the machine production. The articulator holds the same relation to dentistry that the pentograph does to the artist—serving simply to register basic lines—it then remains for the artist-dentist to incorporate *detail, minutiae* and *life.*

There is not so pronounced a lateral movement in the jaw in mastication as previous writers have depicted. During normal mastication the lateral motion of the jaw is slight, seldom exceeding one-third of the width of the occlusal surface of the first superior bicuspid.

The reason why anatomists in the past have failed in their registry of the movements of the jaw can be traced directly to the dissecting rooms, where they have prosecuted their search for knowledge on the cold and lifeless body, instead of the living subject. Further, teachers of anatomy invariably instruct students from the skeleton, which has the lower jaw hinged at the glenoid cavity, whereas it should be pinioned at the line of occlusion, immediately below the glenoid cavity. This incorrect method of demonstrating the position of the jaw has prejudiced the minds of students and instituted a variety of misconceptions.

To Dr. Bonwill we are all indebted for much knowledge on the subject of articulation and occlusion; and I am proud that I received, some years ago, personal instruction from Dr. Bonwill regarding his methods and system of arranging artificial teeth. Though I do not now agree with him in most particulars, I nevertheless revere him for having directed my attention to this, the most complex problem in dental prosthesis.

Before proceeding with the scientific results, as I have found them, I wish to call attention to the fact that the paper is intended primarily to prove that the ordinary articulator, which allows simply a ginglymoid movement, does not admit of reproducing nature.

Value of Illustrations.

To facilitate instruction to students, diagrams are employed as they assist in simplifying the explanations, and aid the mind in retaining outlines and devices. The importance of illustrations cannot be overestimated if it be true, as psychologists say, that fully eighty per cent. of human intelligence is obtained through the optic nerve. They are most essential when it is the purpose to elucidate facts relative to material things; illustrations admit of abridging the reading matter, and in this age of rapid thought they aid the power of both preception and conception. There are teachers who share in the belief that pictures detract from the truly scientific and there are leading educators who never "resort to any diagrams," since they say they are capable of giving perfect word pictures. This may have been the thought in the days of Addison and Steele, but in these time-saving days, instead of wasting four pages describing the lady's hat one-tenth page will portray the headgear and the wearer.

Illustrations serve to abbreviate the subject matter and aid in accurately registering the object in the memory. In fact, in all works which deal with material things, and more especially with mechanics and its varied devices, illustrations are indispensable. To impress this study more fully I request the student to reproduce the diagrams, designing from nature—not from Gray's Anatomy, which is faulty in its odontography.

There is nothing that sharpens the judgment so much as drawing; there is nothing I know of that gives a keener insight into objects and the nature of their imperfections, their ups and downs, their smooth or irregular surfaces, than drawing. The character of the object makes a profound impression upon the brain, in that you must educate the judgment to see and follow the line and carve the outline on paper of the image that you have before you. This calls for your undivided attention and stamps the model indelibly upon the brain.

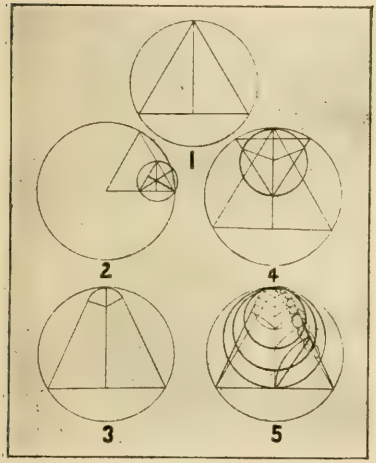


Diagram A.

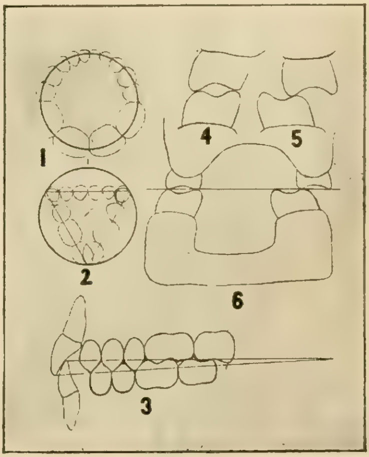


Diagram B.

The necessity for manual training and keener digital dexterity must appeal to all who are familiar with the student career. Men who have acquired a knowledge of drawing and who have given some attention to sketch work readily comprehend the delicate outlines of the teeth. Their judgment for accuracy has thus been sharpened. Diagram A is an accurate reproduction of Dr. Bonwill's theorem and Diagram B indicates his methods of arranging the artificial dentures. I show these to remind you of his idea relative to articulation and occlusion; besides we can then employ them in a referential way during the discussion.

Arrangement of Teeth.

The teeth are so arranged in a dental figure that a strain which falls on any one of them of either half of the superior or inferior dental arch, is communicated to the several teeth on that side of the jaw, thus distributing the strain. Hence each tooth is as independent of its neighbor in its functional character as though the masticating apparatus consisted of but a single superior and two inferior teeth, or vice versa, as Diagram C, Fig. 1, shows. This disposition of the teeth is well illustrated in architecture in the building of brick walls, and is known as "bricking the joints." Fig. 2. In the mouth this arrangement serves the dual purpose of permanently establishing the position of each tooth and assisting most decidedly in breaking food of a brittle character. Fig. 3 represents clearly

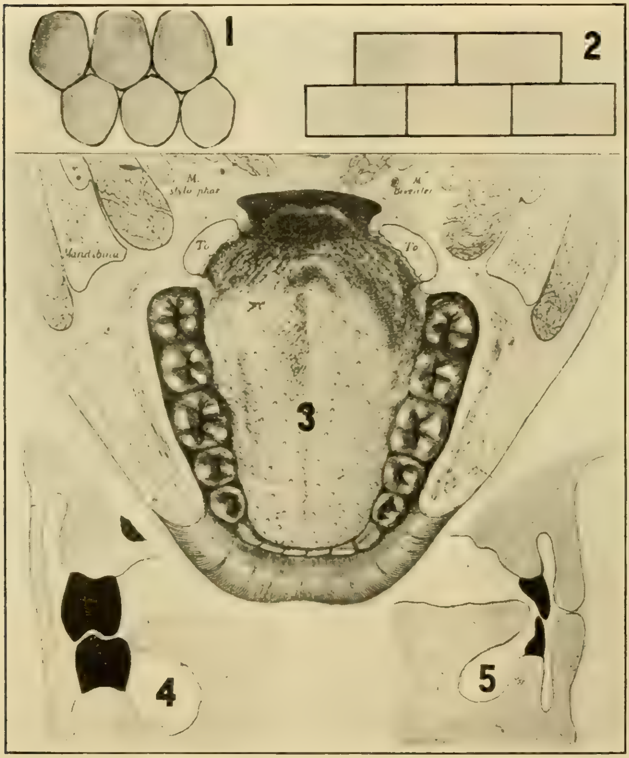


Diagram C.

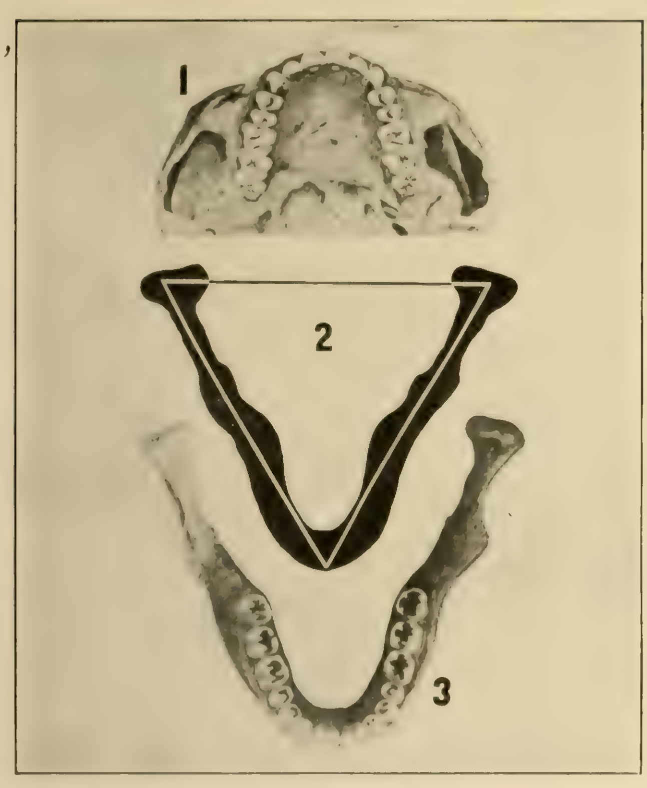


Diagram D.

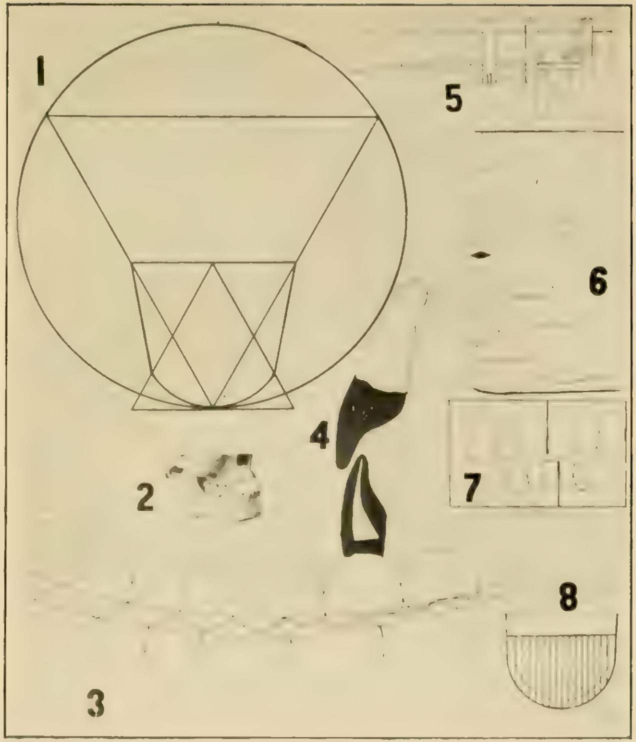


Diagram E.

the inferior half of the mouth, known as the lingual cavity, showing how the tongue hugs the surfaces of the teeth and how the lips and cheeks fold about the opposite surfaces. A wise arrangement in nature admits that mastication can be vigorously prosecuted without molestation of the tongue or cheeks. This happy result is attained in that the inferior teeth extend to the center of the dental figure, while the superior teeth extend to the circumference, as shown in Figs. 4 and 5. Artificial teeth should be ground to yield occlusal surfaces and so shaped that the superior accurately complement the inferior teeth, Figs. 4 and 5. If constructed thus they will glide over each other more readily, facilitating mastication and assisting in retaining the dental bases. I cannot agree with the theory of Dr. Bonwill in his dental forms. He has the lingual cusps of the inferior teeth too high, and they pitch too decidedly outward above and inward below. Such a condition will tend to dislodge the superior base.

Diagram D. This accurately represents the figure which the teeth form in both the superior and inferior maxillary bones. I labored diligently to portray the two jaws in harmony with nature, and have brought innumerable models, casts and skulls to aid in demonstrating that the drawings are perfect. Upon this diagram I base my theorem of trigonometry, relative to the disposition of the teeth, and of which I will speak later. Fig. 1 indicates the superior maxillary bone and Fig. 3 the inferior, while Fig. 2 gives us a shadow or silhouette view. The triangularity of the lower jaw immediately appeals to us; hence, if a line is drawn from the center of the right condyle to the same point on the left, and then two lines from these points that will meet at the septum of the inferior incisors, there will have been described a perfect equilateral triangle. Fig. 2. You will observe that the human jaws are not so pointed as indicated by both the drawings and theorems of Dr. Bonwill. They are not so short and sharp as he represented them. And if he portrayed the shapes of the jaws contrary to nature, he also applied the wrong theorem and could not hope to attain the normal philosophy of these jaws. I am satisfied that he was in error in his geometric deductions, and although he was a close student of this subject, I fear he failed to select the composite jaw, and in consequence did not complement the right geometric figure; besides he advocated that his theory applied to all jaws and was too positive of his measurements.

Diagram E. In this I have designed the theorem which meets the general requirements of the proposition under consideration. In the first place, we use a circle to facilitate getting a perfect equilateral triangle, since geometry teaches us that a perfect equilateral triangle is produced by joining three lines of equal length within a circle. I next observed that in the anterior portion of half of the triangle the teeth were located;

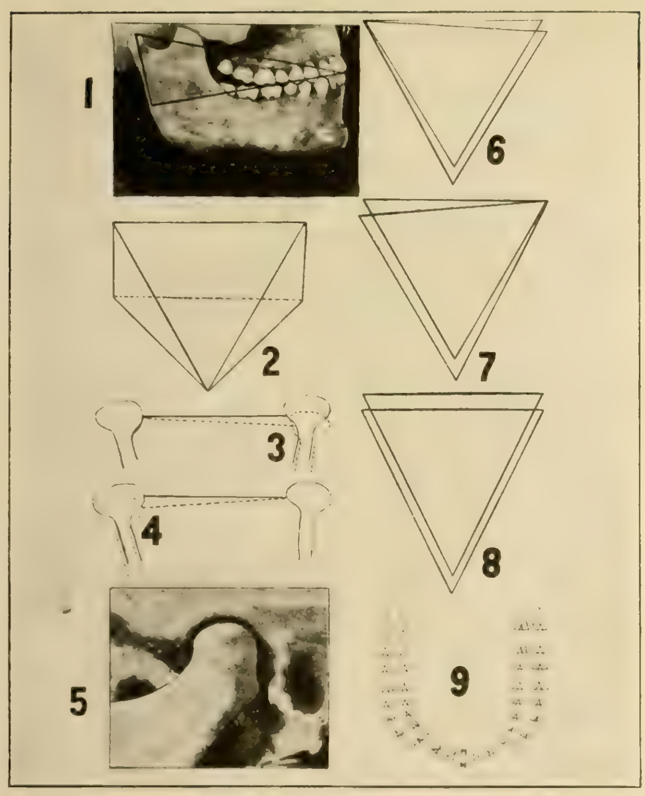


Diagram F.

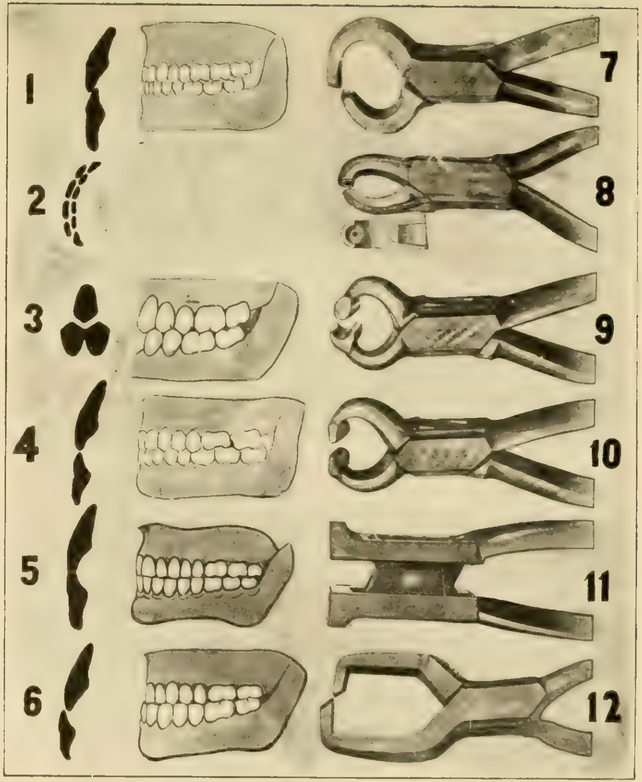


Diagram G.

that the base of this sub-triangle marked the position of the molar teeth. Geometry teaches further, that when two equilateral triangles are brought in opposition with their cones, they form the outer surfaces of a squaic, the center of which describes the arc of a circle. Where the circle meets with the straight line is registered the first inferior bicuspid. It has been taught in the past that the cuspids were the prominent teeth which marked the point where the circle verged into a line, and consequently we have been at loss to ascertain the geometric figure and proposition. This would answer our purpose. The first bicuspids in the inferior maxilla are the guiding points and their importance must not be underestimated, as I will shortly demonstrate.

Dr. Bonwill was working along the right lines, but accepted the wrong theorem, and consequently his jaw is too pointed and does not fulfill the requirements of nature. You will notice that this vexed query is simplified by my figure in that we dispense with the innumerable lines, circles and fractional circumferences found in Dr. Bonwill's theorem. The question is not one of circles, but of triangles, and the next few figures and diagrams will prove that triangles are the fundamentals.

Fig. 2 gives a clear idea of the curve which is found when viewing the jaws from the lateral aspect. Dr. Bonwill taught us that the length of the cusps diminish as we go distally. This was indeed a great discovery and I need not dwell on the importance of understanding the purpose of this curve and the necessity of knowing the value of Dr. Bonwill's deductions in their relation, for all present must be familiar with this, the crowning glory of that great man's life. I might add that he represents this overbite as a triangle, Diagram B, Fig. 3, and I have drawn it to approximate nature and represent it as two curves approaching each other distally.

The lower jaw during the process of mastication forms somewhat of a triangle while opening and closing, as Fig. 4 indicates. When the jaw is opened it falls backward and downward, and in closing it moves slightly forward and then upward, describing the outlines of the figure represented in Fig. 4. Now, if the anterior tooth goes through this movement and describes such a figure, all the inferior teeth, being a stable part of the jaw, must necessarily form a like figure. To determine what relation this movement has to the shape and movements of the jaw and condyles, I have had manufactured the instruments you see in Figs. 5, 6, 7 and 8, and by their use I have arrived at many interesting conclusions.

Masticating Movements.

Diagram F, Fig. 1, represents what I have chosen to call a lateral triangle, which is formed by a line from the condyle forward to the front teeth, then back over the plane of occlusion and thence up

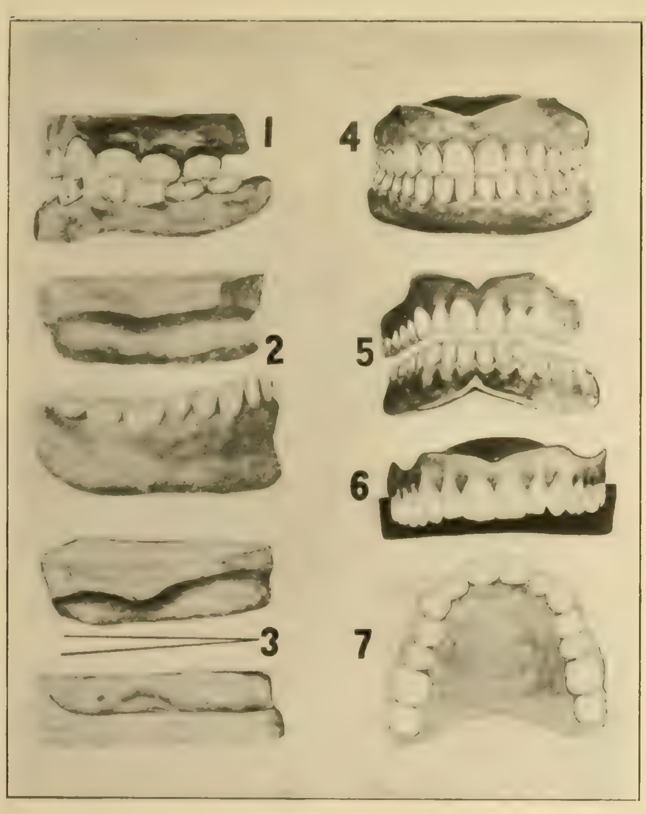


Diagram II.

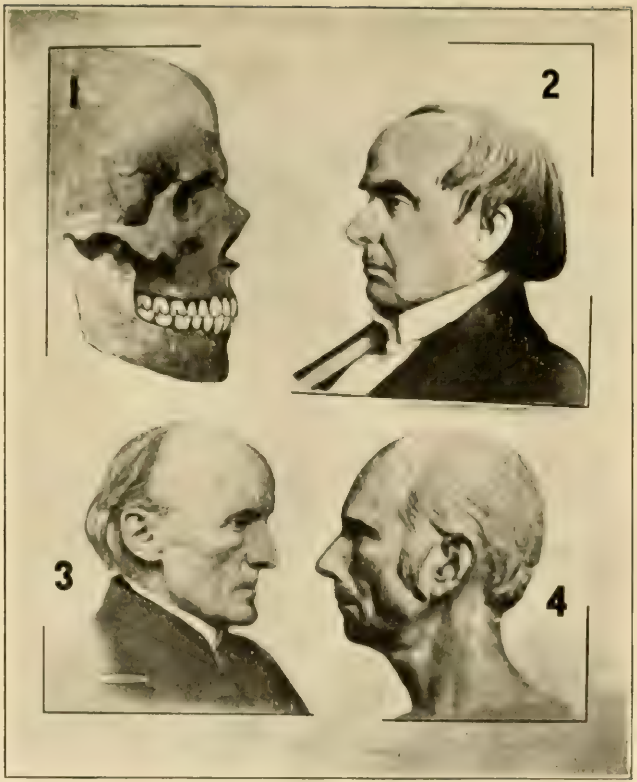


Diagram I.

to the center of the condyle, and the lowest point is the pivotal point of the jaws. When this imaginary triangle is coupled with the anterior triangle they describe Fig. 2. Another set of triangles is formed while the jaw is in process of mastication. When the lower jaw rotates to the left the right condyle moves forward and downward, while the left one simply turns on its axis. The reverse is true when the jaw is thrown in the opposite direction, and in consequence imaginary triangles are formed corresponding to the depth of the glenoid fossa and the length of the cusps of the teeth. Figs. 4, 5. This assists in determining the overbite. When the jaw cannot be freely rotated it indicates a predisposition on the part of the patient to live the life of carnivora, meat-eating; while when the jaw can be readily thrown from right to left there is a disposition in the owner to be herbivorous, grain and vegetable-eating. In the former the glenoid cavity is deep and in the latter shallow. Fig. 5 illustrates the condyle *in situ,* the glenoid cavity being clearly portrayed. The condyle moves forward and downward until obstructed in its further tendency by the eminentia articularis, and when the condyle moves beyond this point there is dislocation. Fig. 6 shows the inferior jaw thrown to the right, Fig. 7, moved to the left, and Fig. 8, thrown forward. The triangle being pinioned at either right or left side, and being a perfect unit, all points must swing in the arc of the circle in proportion as they are distant from the pinion center. If this be true—and I see no error in it—then the cusps in normal mastication must all describe small triangles as Fig. 9 illustrates. Hence, everything seems to indicate that the philosophy of mastication is founded on triangles and not on circles. When we more thoroughly understand these principles we can produce prosthetic substitutes capable of rendering service. If we continue to construct our dentures in defiance of these underlying truths, we are not only yielding abortive results, but are disgracing the Divinity which enters into the work of our noble calling.

Mechanical Forces in Jaw Movement.

Diagram G. I here outline what I think indicates the various mechanical forces which the jaw can employ. Figs. 1 and 7 represent the mechanical force of the front teeth in normal mouths. Figs. 2 and 8 show how the jaws meet simultaneously in cutting. Figs. 3 and 9 demonstrate the force, as applied at the juncture of the superior bicuspid. Figs. 4 and 10 illustrate the force when the front teeth meet directly on the incisal edge. Figs. 5 and 11 indicate the open and shut movements, as in the parallel-pliers. Figs. 6 and 12 show the mechanical apparatus in cases where there is protrusion of the inferior jaw.

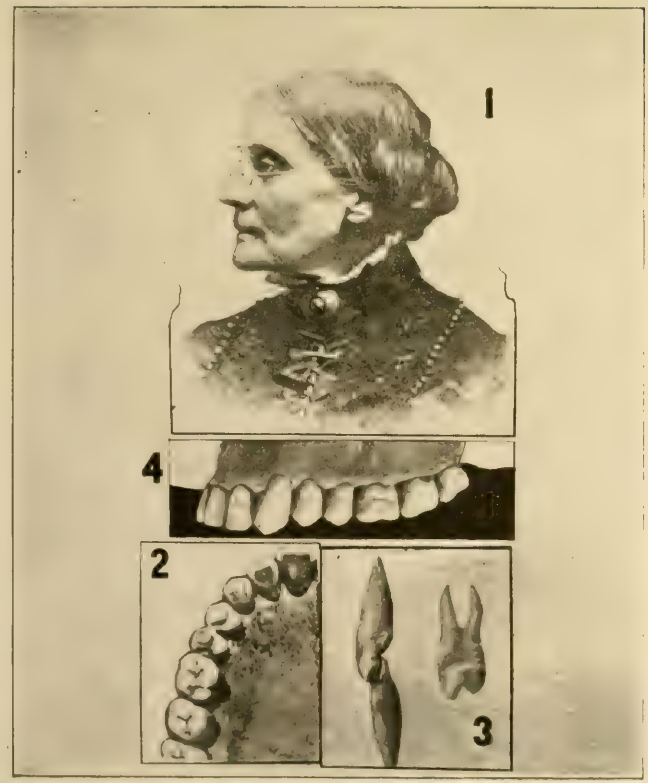


Diagram L.

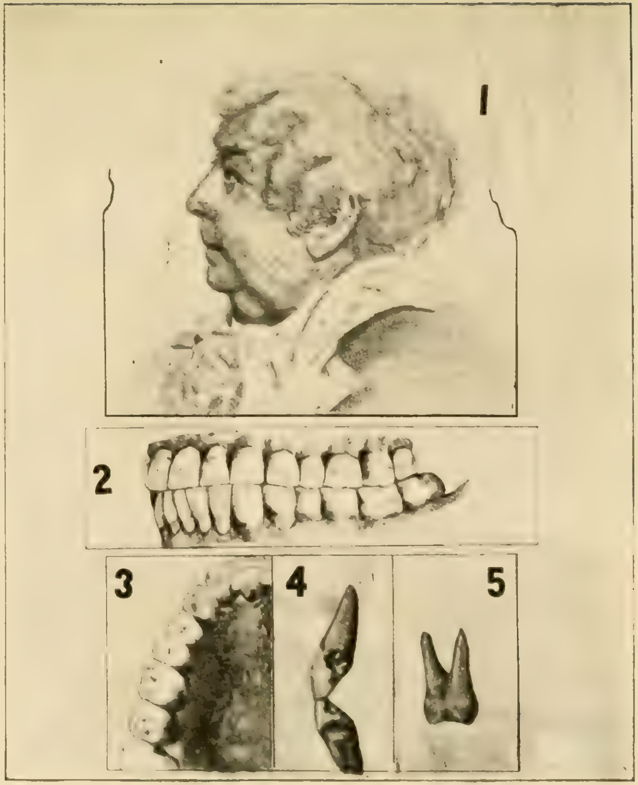


Diagram K.

Problems in Articulation.

We all recognize that in cases of dual bridges, as indicated in Diagram H, Fig. 1, with the ordinary open-and-shut articulator we often produce a splendid case, yet when we attach it in the mouth it requires considerable changing—necessitating the grinding off of porcelain facings and gold cusps, whereas, if we possess an articulator which mimics the jaw, the teeth can all be carefully adjusted before attaching them.

Diagram H. I here present the variety of problems which confront us on the subject of the position of the artificial substitutes. Fig. 1 indicates how imperative it is to be prepared to have our dual bridges constructed to receive the variety of forces of the jaw. Fig. 2. portrays the making of an upper denture when the lower teeth are still in position, thus indicating the curve of occlusion. But Fig. 3 illustrates the difficulty in determining the exact position of this curve. We are at a loss as to whether it shall take an upward or downward tendency, yet on this particular operation depends largely the practicability of the case. I have not been able to solve the problem, though I am of the opinion that the curve should in most cases take an upward tendency, but this would be more easily determined by a careful study of temperaments. Fig. 4 shows how the artificial teeth should be ground, giving a rather pointed and ridge-like tusk. This I contend must be done for two reasons; first, it admits of natural relation of the jaws, and second, the cusps must be so formed as to readily incise, tear and grind the food, since the artificial denture is less stable than the natural one, and the teeth must cut the food with less strain.

The artificial dentures which I exhibit (vide H. 4, 5, 6 and 7), to this society were constructed from six sets of teeth. From these several sets I selected such sizes as approached nature and then ground and shaped them so they would admit of lateral movement, thus mimicking nature.*

A Study of Faces.

Diagram I. This I designed to show the three classes of faces. Fig. 1, the normal skull; Fig. 2, the straight face, represented by Daniel Webster; Fig. 3, the concave face, showing Cardinal Newman, and Fig. 4, the convex face, portraying Henry Clay.

Diagram J, Fig. 1. These variations and the temperament as indicated by Susan B. Anthony, and her constitutional outlines show us that her teeth are well developed and have clearly defined cusps, consequently also a well-rounded curved occlusal plane, as Figs. 2, 3 and 4 illustrate.

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* These specimens are mounted on the Kerr articulator, which is constructed on lines suggested in a paper I read before the Illinois State Dental Society, at Rockford, Ill., May, 1901.

The articulator must be so arranged as to allow for the compensating curve.

Diagram K. This illustrates the opposite kind of face, and is of the lymphatic temperament. The teeth show that the jaw freely rotates. The cusps are illy defined, the glenoid cavities shallow, and there is no compensating curve. The face illustrates that of Elizabeth Cady Stanton. In such cases as hers the denture must be constructed to bear out the normal conditions of rotation.

We of to-day believe in realism. We love and adore the real, and those of us who worship at the shrine of nature reverence the divinely created. The awkward statue resulting from ignorance of anatomical outlines will soon be a thing of the past.

Methods of Teaching the Artistic Elements of Prosthetic Dentistry.

By A. O. Hunt, Omaha, Neb.

In consenting to present this subject before this body, I fully expected to put it in the form of a paper.

After beginning work upon it, I found I could not do so with any satisfaction to myself and without considerable expense to the association, which I felt was hardly warranted. I follow methods in teaching this subject that requires the constant use of the blackboard.

The endeavor will be to give you all that is possible of what occupies the time of three full sessions in the short space of time allowed here.

Prosthesis is the restoration of a part, and there is little we do that does not come under this definition.

My experience is that in order to have the student comprehend the art features in dentistry, it is necessary to begin teaching it as soon as he enters upon his course.

The best results can be obtained by associating the artistic with the mechanical as we proceed rather than to make this a special subject except, perhaps, in the senior year.

Time will not be spent upon preliminaries further than to differentiate between ideal art and art as we can apply it in an every day dental practice. There are few Apollo Belvideres that come to us for dentures.

The variations in faces are so marked and constant that it is not possible to say that what will be suitable for one will answer for another. Each individual case must be studied, yet there are certain conditions that are common to all faces and mouths, which must be carefully pointed out in teaching.

We cannot, like the artist and sculptor, take the canvas or lump of clay and fashion the human body to an ideal; but are compelled to deal with it as we find it, and endeavor to meet the conditions that are presented, and if possible improve them.

The proper classication of this subject should be art-anatomy, as the two are inseparable. In teaching the artistic, the anatomical will always be the foundation.

In the freshman year but little can be done, but that little should be carefully taught in order to establish habits of close observation, and to become familiar with the artistic and mechanical and to be able to discriminate between them and their application to dentistry.

Models.

The student is required to make two sets of models of the upper and lower jaw of his own mouth or his neighbor's.

One made from a modeling compound impression and one from a plaster of paris impression. The modeling compound being completed first, any faults that may be present, that are due solely to the material used, are allowed to stand, until the models from the plaster impression are completed.

These latter should be as perfect as many trials and experiences can make them. The faults are not many finally. Now the two sets of models are compared.

Such things as are common to all teeth are pointed out, the constriction of the teeth at the cervical, the tuberosity at the middle third, the gradual drawing in of the tooth at the occlusal portion, the differences between the arches of the teeth at the cervical, middle third and occlusal margin. Again the universal inclination backward of all teeth. The line of occlusion which is well defined in all mouths only varying in degree, whether there are irregularities or not. The manner in which teeth articulate with each other. The relative size of the teeth as compared with each other. The central incisors with the laterals, the cuspids with the centrals, the cuspids with the bicuspids, the central incisors as to width with bicuspids and molars.

Again the relation of the teeth to each other, and particularly the position of the cuspid teeth, as later on is shown the paramount importance of this arrangement of teeth, and the control of facial expression.

After this the student begins on the first set of models made from the modeling compound to correct the faults plainly in evidence.

When they come to the time of arranging a set of teeth, these models are again brought into requisition, and they imitate what is present in the models.

Each student then compares his own models with those made by other students, and is required to note the variations that exist, always looking for the common characteristics that are present in all.

Teaching Art.

In the junior year, the artistic based upon the anatomy of the parts concerned is taken up in detail. With blackboard diagrams and sketches the study of the muscles of expression is commenced, their origin and insertion and the anatomical relation of each one to each tooth. The function of each in its relation to the teeth, and the relation of the teeth to the lips and face.

The cuspids receive very careful attention, as they control by their position and form, all the movements of the muscles of expression of the lower fourth of the face.

In their development these teeth start from under the alae of the nose, coming into their position guided by the levator alae-que-nasi on one side and the levator labii on the other.

When in position the *cusps* of the cuspids are directly underneath in a line perpendicular with the outer alae of the nose. The fibres of the orbicularis oris with the fibres of the other muscles entering this region, draw over the canine eminence much as a rope runs through a pulley-block thus controlling to a large extent the expression of the face.

When on the subject of impressions the importance of restoring the buccinators, orbicularis anguli oris and other muscles to their normal position is dwelt upon particularly, as in no other way can a failure to do this at this time be corrected in later procedures.

Taking the Bite.

In taking the *bite* the method pursued is essentially the same as published by Dr. Molyneaux in Essig's *Prosthetic Dentistry* as a basal plan. The methods are somewhat different as more landmarks are obtained than there presented.

With the wax form in position the expression of the face is first considered.

To reach the proper results the relation of the teeth to the lips and face are first considered, as their position is important in this respect.

We begin, as Nature does, to first locate the inferior incisor teeth as to length, which is always the length of the lower lip, found by passing an instrument between the lines at right angles to the plane of the lower fourth of the face.

Next the contour of the wax is shaped to correspond to the labial and buccal alignment of the teeth both upper and lower, the upper protruding to equal the overbite of the upper teeth.

Should the commisure of the mouth be crooked, by additions of wax above or below this may be corrected. When the place of union betwen the mucous and cutaneous portions of the upper and lower lips are directly over each other in the plane of the face the position of the jaws and lips are correct.

The occlusal margins of the central incisors (the wax) should lightly touch the inner edge of the lower lip.

The cusps of the cuspids lie directly underneath the outer alae of the nose.

The median line (a very uncertain one) should be carefully noted. The high and low lip line.

The free and unobstructed movement of the anguli oris muscles over the wax to allow the mouth to open to its fullest extent to prevent the too great prominence of the bicuspid teeth.

These landmarks should be carefully and accuraely made. When placing in the articulators all should be preserved and retained by gauge, or otherwise, until the time of removal from the articulator.

Many things are passed by because of their mechanical nature and belong to the subject but time will not allow of their consideration.

Next is considered the artistic selection of teeth according to temperament. In this year only the fundamental ideas of temperament are taught as they apply to the teeth alone, reserving for the senior year a full and elaborate discussion of this subject.

The type, color, size, etc., of the teeth of each basal temperment is thoroughly impressed upon the student at this time; more would be confusing.

With the landmarks already obtained the Bonwill system of the grinding and arrangement of the teeth is made to conform, in this way combining the best in mechanics and art.

The final shaping or finishing of dentures is especially considered for the purpose of keeping the muscles in their normal position, preventing their action from displacing a denture, and utilizing the buccinators and orbicularis oris from retention. Last but not least the shaping of the canine eminence for the movement of the muscles freely and normally over them.

In the senior year a review is gone over of the artistic principles and their practical application.

These principles are verified by casts of many faces and models of the teeth accompanying each, made from living subjects showing normal conditions and others showing the variations which are constant that are neither deformities nor irregularities.

These casts are also used to show how these variations may be modified to approach more nearly the ideal.

Temperment is now fully considered and models of heads indicating the types and combination of types.

Selection of teeth noting the varying shades of teeth as observed in natural teeth according to Dr. Royce.

All this is applied to the making of practical dentures with notes on such changes as may be made and the reasons therefor.

I have made use of the lantern and chart to illustrate this subject. They did not fill the requirement entirely as many times in addition to these accessories I am compelled to fill a large blackboard with sketches and supplementary drawings.

Discussion on Papers of Drs. Cigrand and Hunt.

Dr. F. H. Berry, Milwaukee, Wis.

I undertake the discussion of these papers from the standpoint of the teacher. In connection with Dr. Cigrand's paper, is he teaching the teacher the when, where and how to teach? Dr. Hunt has told us much about the when, where and how, but I think you will all agree with me that there was very little of this in Dr. Cigrand's paper. By the "when" I mean freshman, junior or senior. By the "where," the laboratory, lecture room or infirmary. If a man is capable of holding the position of teacher of prosthetic dentistry, he should not come here to learn *what* to teach. The question is how, when and where will we teach it. We all know what to teach. Dr. Cigrand in the course of his remarks considered the usefulness of articulators. Is this the place to discuss that matter? I think that should be taken before a State society meeting and not a society of teachers.

I believe that the operative men know better the how, when and where than the prosthetic men do. They teach first dental anatomy; then operative technique and finally teach in the infirmary demonstrating on the living subject. What does the prosthetic man do? He takes the freshman student and teaches him how to take impressions; how to take a bite and how to make a plate; giving him Dr. Bonwill's teaching. We allow students to construct their technic work along that line. When they are seniors we teach them all about temperament, and here we undo all that we have taught by our Bonwill's diagram. In the freshman year we must point out some of the parts of the anatomy that correspond to the articulator so that they will look upon the articulator as representing natural conditions. We point out the temporal muscle, the masseter, the condyle, the sigmoid notch, the glenaid fossa and its relations to surrounding structures, building up little by little a human articulator.

Then we teach that all faces are not alike; that there is a great difference in the size of the condyles, and in the length, and shape of the sigmoid notch. Then we teach an ideal line on which to build a plate. It is a fact that temperament is in keeping with the outline of the glenoid fossa, which differs in almost every skull. Of course, the teeth that accompany them vary accordingly, and here again we dispute our ideal outline of plate. Dr. Cigrand dwelt on the importance of using the proper articulator. If we are going to teach Bonwill, why not use his diagrams? We could not tell a freshman to set an upper and lower model in the articulator, unless we have explained to him the depth and angle of the glenoid fossa for the reason that if the bows in the Bonwill articulator are closed up, we get a parallel glenoid fossa which accompanies lymphatic temperament. If we get a patient of a nervous temperament then we make the casts a little thicker and throw the bows further apart. Then we get a deepening of the glenoid fossa, represented in the action of the Bonwill articulator. It makes little difference where the hinge of the articulator is because the moment the teeth separate the occlusion is broken; aim to get the bite correct and it does not matter where the circle described by the opening of the articulator is struck. Get the bite of correct length and set up the teeth natural distance apart of the jaws, and you do not need to worry about the circle of the hinge of the articulator, it would be the same at occlusion no matter what the diameter may be. We have no system and do not know where to begin nor end the teaching of prosthetic dentistry. There is no outline by means of which we can get the thing into the minds of our students. If we want to make the teeth longer than the bite, that is to open the bite, then the circle makes some difference; but as soon as we begin to meddle with the bite and change its length in the articulator then it is guesswork.

Dr. Hunt showed us that the lines of the face and of the teeth are in keeping. Where are we going to teach that? I think to the freshman, because when they get to be juniors and are setting up teeth in specimen cases they need that. My idea is to teach freshmen anatomy, along the artistic line, and temperament or its equal. Then, in the junior year, give them photographs as near as we can to the four basal temperaments and allow them to set up teeth along these lines to suit the photograph. In that way you instil into their minds the fact that they are working after nature; whereas, in the other way they work after mathematical drawings, and when they get to be seniors they know nothing of temperament or facial lines. Dr. Angle has drawn a facial line striking the eyebrows, lobe of nose and lips. He calls this the ideal. But it is not often that we find an ideal face, because we have a mixing up of temperaments, and it is hard to get the student to recognize the different temperaments presented. It is a good thing to show him the actual face and make him recognize facial lines.

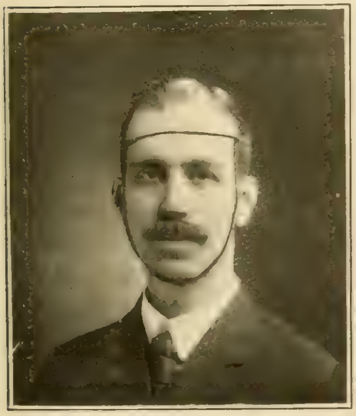

Fig. 1.

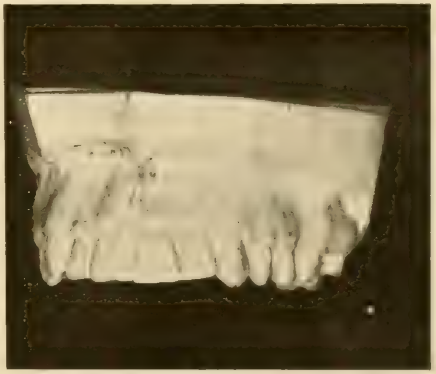

Fig. 2.

The point I want to make is that I believe it is impossible to teach students temperament. How many of you really understand the theme of temperament and can put it into use and feel sure of it? My idea is to teach a comparison of things as we find them. I want to show you my method of teaching one subject, that is that the facial outline always is the index to the shape of the central incisors. That is a good guide for the student to follow. Strange to say, our manufacturers do contrary to the study of temperament. They give us a long slim tooth and color it a dark yellow or bronze color. How often do we see such a tooth in the mouth of an individual of a nervous temperament? We must teach our students colors from another standpoint and not allow them to buy what is given them by the manufacturer, because manufacturers construct teeth with reference only to selling them.

Draw a line across the forehead about midway between the eyebrows and the hairline (Fig. 1) Follow the chin line to the angle of the jaws on either side and upward to the first or forehead line. Cut out this diagram and you will find that it is exactly the shape of the central incisor that fits that face. (Fig. 2.) The upper third of the face has much to do with the shape of the teeth and this in turn with the expression of the face.

The place to teach that is in the junior year. Let the students compare their faces and their teeth, and when you give them a photograph all they need to do is to get the outline of the central incisor and then select the teeth that go with that temperament, and construct on lines peculiar to that class as indicated in the photograph. This should be associated with the teaching of temperament in the senior year.

Dr. N. S. Hoff,
Ann Arbor, Mich.

While Drs. Cigrand and Hunt were presenting their papers the thought that impressed me more than all else was not the details of the methods they advocated in teaching their subjects, but what is the value of the presentation of this particular subject; is it not the personality of the men themselves that makes their work characteristic? Not all their ideas are new, but the method of presentation is new, and I am particularly impressed with the thought that these men must have done much original work in order to be able to present this subject as they do. What is the value of that work as compared with the more pedantic methods of presentation that we get from personal experience and from text-books? Which is the better method? The pictorial method, the didactic or the lecture method? Although I cannot take the time to discuss this phase of the subject fully, yet I will say that in my opinion both methods have value. But a good method combined with a strong personality in the teacher is worth more than any method, however good it may be.

What makes these illustrations valuable? The men who presented them thought profoundly about them! They have made them a part of their lives; they present them with enthusiasm and with a personality that claims the attention of the students. I do not think that it is always best to present them pictorially. There are other things that a man may do to claim the attention of his students; but it is the personality of the man that counts, even though he may be teaching error. If he is deeply impressed with the truthfulness of what he is teaching, his teaching must be forceful, and it will claim attention.

Dr. Cigrand is a very fluent speaker and illustrates his work in a beautiful way. Dr. Hunt is a graceful and consecutive thinker. He enthuses and charms his audience, and all that adds greatly to his influence as a teacher. The fact that these men have worked out these things, and that they have identified themselves with them, give them power and force and enthusiasm, and this enables them to strike fire in the minds of their students, which in turn brings out the best characteristics of the teacher. Whether or not a teacher is a brilliant man in the eyes of his students is not essential; a teacher should be a man of character, for in his individuality he has power over his class that the more pedantic man can not have.

Every teacher should be not only a reader of books and current literature, but he should be a diligent student enthused with what he is doing. Students want to be loyal, and if a teacher has an admirable character, they will almost worship him. If he has faults, they accept them and make allowances; but they always identify themselves with their teacher. In this subject of prosthetic dentistry I know of nothing that gives a teacher so much power and influence over his hearers as enthusiasm, individuality, forcefulness and power of thought.

In reference to Dr. Hunt's paper, the effort he is making to establish principles is very commendable, and is what we desire, because if we can settle basic principles it will help us to devise methods of teaching. Very little has been done along this line, and, therefore, I am very glad to have the subject presented in this way. It will stimulate us all. It is desirable that we incorporate these ideas in our text books, and nowhere can papers be read with more benefit and profit to us as teachers than here.

The question has been raised whether we are not getting away from the original idea of this Institute by presenting papers, which, in the minds of some, should have been presented before a dental society. These are the very papers we want, because they will prevent us from becoming narrow-minded and doing work that will be of little value to us as teachers.

Dr. Hunt said that prosthetic dentistry is everything. Yesterday we thought that orthodontia and the four-year course was everything. Everything we bring up here seems to be important, and this is as it should be.

Dr. Geo. H. Wilson, Cleveland, O.

We have had some very scientific papers presented on this subject, but, it seems to me that the profession at large and the teachers are hardly in accord. A little less than two years ago one of our leading dental journals published an article written by a gentleman from the East discussing this very subject, and he made a strong plea for "mush" bites. I cannot conceive where there is any art or science or esthetics in the "mush" bite. In the same journal, the next article, read at the same State society, a teacher made a strong plea for art in dentistry, but before he was through he greatly lamented that gum section teeth were going out of existence. The manufacturers told him, he said, that there was not more than one set of gum teeth used today for ten of the others. It has always seemed to me that gum section teeth had the same relation to plain teeth that ready-made clothing has to tailor-made clothing. The one is made for everybody and fits nobody in particular, whilst the other is adaptable to the individual.

A year ago, at the meeting held in Chicago, we had a great paper on prosthodontia. There were two main thoughts in the paper: The first, criticizing dental colleges and their teachings; the second, was a classification of the temperaments. In discussing this paper one gentleman criticized severely the scientific part that relates to temperaments. He felt that this could not be taught to a class. I wondered then how he could teach a science if not by such means as this, because science means a classification of knowledge, or what we call facts; and by classifying, or by formulating a system, as it were, we can present facts to the student. If it is not by this method, there is certainly but one method by which we can teach, and that is by intuition. And I would like to have some one tell me how to impart intuition to students.

Dr. Berry apparently has changed his methods from those he had a year ago. He has some very good ideas. Contrary to my preceding remarks I do believe that the profession and the teachers are ready for this high standard at the present time. I cannot agree with the doctor that the subject should be presented to this body under the heading of when and how only, but also what. I believe we all should be taught what to teach for the reason that at the present time we have no universal way of presenting the subject. We want to know more about each other's methods, and by presenting methods we can get an idea of what others are doing, and in time we will get together. Therefore, I approve fully of the papers presented.

The first paper contained many excellent ideas as well as facts; the fundamental fact, that of anatomical relation, was well dwelt upon, because we must understand the anatomical before we can understand the artificial. We cannot restore the anatomical once it is lost any more than we can restore the life that is fled. That is impossible. When a tooth is lost we are confronted by a condition that we cannot restore to the normal, but we do the best we can, and in order to accomplish that end we must possess a thorough knowledge of the anatomy. We must meet certain conditions; the question is largely one of physics. The laws of leverage are of importance. Before the teeth are removed the alveolar processes are well developed for the purpose of supporting the teeth. When the teeth are lost, nature proceeds to remove the process by receding upward and inward, in the upper, and in the lower it recedes downward and outward. So you can see at once wherein leverage plays an important factor. Is it possible that we can arrange the teeth, so they are a reproduction of nature and yet have them well retained?

Dr. Cigrand advised that we arrange the teeth so they would point slightly inward. That is wrong, for the reason that force always is carried at right angles from the surface from which it emanates. If the upper teeth point inward toward the lingual surface, the force is applied over the buccal cusp, where there will be a tendency to push the plate outward. We should bring the teeth, as far as possible, directly under the alveolar process, and as nearly perpendicular as possible. This refers to the upper bicuspids and molars. (Black board illustration.)

That will apply in extreme cases where we must depart materially from the anatomical arrangement. For instance, with the molars we find that in order to retain the denture well it is better to carry the upper molars toward the middle of the arch, and the lower molars outward, so that the buccal cusps of the upper will strike in the sulcus of the lower teeth. That is not anatomy, but from the practical point of view in extreme cases it is decidedly a question of mechanics. We must impress upon our students the principle of leverage, and yet, at the same time, for the esthetic side of dentistry we must keep as close to the anatomical arrangement as possible.

Prosthetic dentistry is the art, science and esthetics of restoring a lost dental organ or organs by means of artificial substitutes. There are two kinds of art, the mechanical and the ideal or esthetic. I think it better to use the word esthetic to represent the one, and the word art to represent the mechanical. Science is classified knowledge. We should classify as much as possible so that we can present facts to our students. We need to have them learn the art side, that is, skilful manipulation; and then we must develop the esthetics.

When, how and where shall we teach these things? All minds are limited in ability to grasp ideas. I believe it far better to present one thought and make it fast than to present three and not impress any of them on the mind of the student. I believe the technic laboratory is the place where the student gets his first conception of correct principles. We start them in on mechanics, having them take impressions, etc., without burdening them with any special ideas of anatomy and temperaments. It is only a question of getting the hand at work; of doing something. After a while, in the lecture room, we can begin to teach them science. We can classify and explain to them why they did this and that. They can understand it then, because they have done the work with their fingers; they have something on which to base the principles we are giving them.

Then, after they have studied the science of prosthodontia, we can impress upon them the necessity of the artistic side, or the esthetics.

Dr. Berry brought out beautifully an idea with regard to the selection of teeth, especially the form of the teeth; a novel idea and a very good one, but what was the foundation of the form of that tooth? It was temperament which in that particular individual is true; but in the strongly marked lymphatic temperament peg shaped teeth would be indicated by the doctor's rule. The student should be taught that there are various temperaments. That there is always perfect harmony throughout every individual. That the color of his hair, eyes and teeth; that the shape of his body; that his mentality are harmonious. He must be taught the reason for seeing that harmony. We should always appeal to the student's intelligence in our teaching.

In the second paper much stress was laid on the artistic side of the question, which I think was excellent. One remark was made that at first I thought was not going to bring out the whole truth, and that was in regard to the muscles of expression. He said that the muscles of the upper lip are all elevators, but then told us that there is a superior depressor of the lip, and it seems to me that that is not, by any means, an unimportant muscle. Great stress was laid on restoring the cuspid eminence, which I think is very necessary, but at the same time I think we should lay stress on the restoration of the incisive fossa. In this fossa is the origin of the depressor of the upper lip. There are two branches to this muscle, one attached to the lip and the other to the septum of the nose. When the teeth are lost the aveolar process recedes, and the result is that the origin of this muscle is carried backward. Consequently the lip is drawn in or curled under, and the tip of the nose is drawn down. How can we ever restore that expression by padding? I say that it is absolutely impossible, because if we make the plate press on this muscle we are putting more strain on it when it is already strained too much. Therefore, great care should be exercised that the incisive fossa is not filled in too much. We must not exaggerate a condition that already exists.

Dr. W. S. Bebb,
Los Angeles, Cal.

I was very much pleased to hear Dr. Cigrand say what he did with reference to the importance of studying comparative anatomy in its bearing on the subject he presented. Unfortunately, this subject is much neglected in the dental curriculum, and yet it is of great importance in numerous branches of dentistry. Dr. Wilson said truly that "we could not make a perfect artificial substitute until we understood anatomical relations." To understand these we must know the sources from which they emanated.

Dr. Cigrand.

I have enjoyed this discussion very much and consider it a great compliment. I expected adverse and drastic criticism because that, really, is what we come for; that is the way we learn. We are here to learn. We are teachers. Yes, with a small "t;" and we are STUDENTS, all caps, as the printer would say. We are here to learn and whenever a method is presented that appears to be deviation or digression from what we have been teaching, you can assure yourselves that that is the best paper you will hear. There is always some opinion imparted in it. I always like to hear a paper on any dental subject, not only prosthetic dentistry, that is different from my views on the subject, because then I can learn, and I will continue a student as long as I live.

As to when I teach this? I teach it when I teach the anatomical arrangement of the teeth, in the freshman course. I devote the entire time in the freshman year to taking impressions in plaster of paris, and to teaching the anatomical arrangement of the teeth as I presented it this morning. Not a freshman in our school makes a crown or bridge. He takes impressions and studies anatomy of the face until he realizes what he is doing. When he is a junior he is in a position to understand lectures on crown and bridge work. My freshmen know only the anatomical arrangement of the teeth; the angles of the face, movements of the jaws and the laws of harmony. They have nothing to do with plate work in the junior year, but stick to crown and bridge work. And when they are seniors they join them all according to the laws of harmony and nature. We ought to get together on definitions and terminology if we want to express a certain definite idea in certain words and terms. That would be progressing very much.

So far as the teaching of prosthodontia is concerned, it is the same as prosthetic dentistry. But we ought to go further. We ought to have dental prosthesis, oral prosthesis and facial prosthesis. Dental prosthesis in the freshman year; oral prosthesis in the junior year, and facial prosthesis in the senior year. There are many things along that line that we ought to harmonize.

Dr. Hunt made a remark that brought to my mind a suggestion as to the setting of the teeth. I have my students diagram, draw and carve and rearrange the teeth. They cut forms of teeth out of yellow blotting paper and set them on jaws made of blotting paper. I ask them to study certain forms and they all get together and compare them. There is nothing that impresses the student so much as drawing, diagraming and modeling. I make them draw and diagram on the blackboard. Before I get through with them they can draw and model teeth beautifully.

An Ideal in Pathology.

By Dr. D. R. Stubblefield, Nashville, Tenn.

Teachers in dental schools are not supposed to deal much with ideals. This is mostly due to the fact that the dominant idea with the average dental student is to learn to *do* something. It is very easy to get his attention when there is "something doing," for his very fingers itch to get into the actual work. He is only happy and contented when he is blundering along in some attempt to do what he has seen done, or only heard of, without a clear mind-picture of the end aimed at. He may succeed by dint of luck or happy accident, but skill is only attained by him who first gets a clearly defined mind-picture and from that ideal works to a certain end. In other words, ideals must exist before definite results can be expected, whether in one or another field of human enterprise. Therefore, we would enter here a plea for better, clearer, more definite ideals as the best, even the most necessary foundation for all our work. We do not think this end can be attained by a happy-go-lucky, slipshod method, but it should be the intelligent aim of the teacher to get himself so saturated with the highest conception of his work that he will not be able to express himself without voicing his ideal to his classes. Set on fire by this ideal, he becomes the ideal teacher. All the world's great reformers have been ablaze with an ideal which could not be shut up within them, even if they were to be martyred for the utterance. They were the men with messages to deliver and they left an ineradicable impression upon their day and generation. While this is true the world is not altogether pleased with the idealist, or, as they say it, a "dreamer of dreams." He is looked upon as unsafe, as one who dreams while others work to do things. And helplessness toward it. This is not as it should be, for there is no "ology" so abstruse that its essentials can not be rendered plain if we go about it in a plain, common sense way. At the same time we confess very freely that it was not long ago when it seemed impossible to get such a grasp on this subject which had not been thus simply impressed upon us, and it seemed almost unthinkable to get on intimate terms with it. An old friend used to say that when he was growing up they studied at college "Losophy, Gosophy and Phleanikislunk and nothing else, which put the college men above and beyond ordinary mortals." This always comes to mind when we find this idea of pathology being beyond the ordinary man still alive though possibly unacknowledged as such. But it can be understood if we take its simplest, initial principle away from its usual setting and digest it.

Inflammation

Let us say that every disease from whatever cause is an inflammation. An inflammation, according to the books, is interference or disturbance of the nutrition of a tissue or organ, characterized primarily by hyperæmia and accompanied by certain definite symptoms. In a word, it is just about what we gave as the definition of pathology, except that pathology is a discussion of the series of manifestations following upon an exciting cause. Pathology, then, for our use is only a *discussion of inflammation*. In this we find and present you our ideal in pathology.

To go one step further, according to the texts, the cardinal symptoms of inflammation are: "Redness, heat, swelling, pain and perverted function or febrile condition." These are the typical manifestations of the results or changes going on, which to be equally discernable must have an equally favorable locality to show themselves. Such a condition is rarely if ever found. We may have one or more present but from the nature of the case there can not be the same proportionate degree in all. Hard structure, as bone, will not exhibit redness or swelling; deep seated inflammations may be too far from the surface to show readily; and so on. But in all we find or have good reason to believe present, if not easily seen, disturbance of the circulation and perverted function in part or whole. Thus it is easy to establish the analogy between ordinary inflammation and any localized structural disturbance. This analogy is much more difficult to establish in the minds of the students when we take a more general systemic excitement as the illustration. This requires more mental effort, and mental effort they can not or will not make except after artful persuasion. Our eminent friend, Dr. E. C. Kirk, once said that the most insulting thing he could do was to compel his classes to think. Doubtless, all teachers agree more or less fully with that statement. A question that can be answered by rote is all right, but any turn or twist of an old, familiar question that requires a little hard thinking raises a row. The very thing that education means, if it means anything, almost raises a mutiny, or, at the mildest, is an affront to their self-love. Yet to stimulate the growth of the mind, to accustom it to think should be the highest aim of every educator whether engaged in general or special work. Just here the inquiry comes to mind if that aim is not too often overlooked partly or entirely in our dental educational institutions.

To return to our subject. There can be no doubt that it is difficult to always clearly see the analogy between a localized inflammation, as a furuncle, say, and an idiopathic fever, but it is there nevertheless. We have only to think that the cause is acting more generally in the one case than in the other, and the results may be seen under the glass to be the same. We see the blood current accelerated in response to the excitant, the increase in speed and number of the leucocytes, the rise of temperature in both, the increase of size by this rushing of more blood to a special or general alarm, and a more or less decided perversion of function depending upon the extent or duration of the excitement. In both instances there develops an increasing exaltation of nerve susceptibility ending in pain if prolonged extremely. These general similarities must be considered broadly and the analogy must cease when the large lines of likeness are lost in the minutiæ of limited areas. Like the masterful sweep of the truly artistic brush, the minute is swallowed up in the salient forcefulness of the wide treatment and the discerning mind catches the idea and is satisfied. Students have not, as a rule, adequate discernment to hold a firm grasp upon the golden thread of the analogy, and once the end is lost they fail too often to catch it up again. Some of this uncertainty is doubtless due to the obscurity in the mind of the teacher. If the teacher is full of his ideal, he will very naturally recur again and again, like a spider weaving his web, so as to give his classes frequent opportunity to see it clearly and re-establish a strong connection with the central idea. It is our aim to present the broad principle of inflammation so simply that it not only can, but must be understood, never losing sight of it ourselves in any amplification. If the claim is made that it is too narrow, too much like the crudities of our earlier and less cultured years, we meet it by saying that teaching must be fitted to the taught without any reference to any preconceived ideas of fitness or technical fulness. One clear and definite idea is undoubtedly worth a multitude of vague and uncertain theories that can never be crystalized into sensible, practical cognitions. This applies to teacher and student alike. Therefore, if this simple, clear idea may be once established in the mind, there is something there that is his—something that he can digest and realize upon. He will soon be conscious of its simplicity doubtless, but from it as a basis he can surely reach out to other things, certainly and logically deducted from that certain idea in his own mind. Without some such simple idea in mind he is never certain, and, like some wanderer in a bog, he goes falteringly from one uncertainty to another, fortunate if he succeeds in stumbling across, with no hope of return.

Oral Pathology. Let us now give some more practical application of our ideal to our own special branch, oral pathology. Take stomatitis, an inflammation of the mucous membrane of the mouth, ranging from the simple gingivitis to the most serious involvement of that tissue from a destructive, specific inflammation. Here we have a wide reach of conditions, from the infinitesimal and simple to the largest possible surface and complex specific involvement. The causation may, in fact does, differ and may be the all-important task for the physician to undertake, but the symptoms are essentially alike, differing in degree rather than in kind. We have the capillary engorgement, sensitiveness to pressure, the solution of tissue where the inflammatory process has culminated in degeneration, the increase in size shown in the tumifaction—in a word, all the cardinal symptoms of inflammation open like a book.

Again, in the diseases of dentition. As you remember, the text-books divide them into two classes: the true and the so-called. In the true, where the tooth germ, like any other tissue or organ, suffers from a real interference with its nutrition, we apply the measure as set forth above and we find local tenderness, redness, heat, tumifaction—in a word, all the symptoms necessary to establish its identity as a true inflammation. In the other, the so-called, we may just as easily prove the absence of all those symptoms locally and may boldly assert that whatever it is or is not, it is not a disease of dentition. Boldly is used advisedly in this connection, for the physicians will not always sustain you in this assertion. They have been known to diagnose the effects of teething in children who had all twenty deciduous teeth in position, and it is a bold, not to say a rash, dentist to stand up for his convictions in the face of the irate family doctor. In the so-called diseases of dentition there is certainly some disturbance of the nutrition going on and, as we see it, Nature is engaged in a great effort to rid the system, especially the alimentary canal, of a less or greater mass of indigesta, if not indigestible substances. To call such efforts on the part of our inherent health principle a disease of dentition is just as sensible as to look upon dentition as essentially a pathological process with or without complications. There may be an interference with the process of dentition, attended by all or enough of the cardinal symptoms of inflammation to clearly show a case of inflammation, but with gums normal in color, no intolerance to touch and none of the local signs of that process, it is wooden, to say the least, to acquiesce in such an idea. In the so-called disease there is certainly an error of nutrition, the digestive function is all upset, but there is no reason in the assumption that it is a disease of dentition because this disturbance happens about the time when certain teeth are due and may be erupting without any of the signs inflammation.

In like manner we might apply our ideal to every form of that protean process called inflammation. It is not necessary that we find the certain cause of any inflammatory condition, although that is the wisest and best when possible for us to recognize the more or less definite presence of some or all of the cardinal symptoms; but when we can get this simple cognition as the basis of all such conditions we can feel that we can get on much more intimate relations with them and the pathology of all their breed.

And this, gentlemen, is the object aimed at in our discussion to-day.

Discussion.

Dr. O. E. Hertig,
Pittsburg, Pa.

It is with considerable embarrassment that I attempt to impress my feeble efforts upon this august body in regard to a field so vast and so impenetrable as pathology. One thing that impressed me on arriving at this meeting was the reason of our being here. One gentleman said we are here because we are teachers, and that we want to show that we are teachers. Another gentleman said that we are here as teachers with a small t, and as Students with a big S. The very existence of this institute is evidence that there is a weak spot somewhere in the teaching ability of the teachers of this country. We are here to exchange experiences; to learn and to profit. I am only a beginner in this field, but as much as I ever may know it still will be but little compared with what there is to learn. We are here to learn to teach; and one of the greatest missions of man is to teach those who know less than he does.

Why is it that we have such intolerably stupid material to deal with in our schools? Everybody says that the boys cannot think, and that you insult them when you try to stimulate their thinking apparatus. This is true to a certain extent only, because among the students you encounter some who have a decided capacity for clear and intelligent thinking—a capacity that often is lacking in more highly educated men. Why is it, then, that we have this stupid material to deal with? Ask yourselves. We are all teachers interested in similar institutions of learning, and we know that because the dental colleges receive such material is the reason why they are complaining about the lack of appreciation and the stupidity of their classes.

The remedy is plain. You all know it; I need not say what it is. With a class of men who have been taught to think from boyhood up; with a teacher aflame with an ideal as described by the essayist, then may we expect ideal results. In no field are these results more to be wished for than in the field of dental pathology. Ideals are delicious things to contemplate. We look forward to, and we strive for, and try to emulate an ideal. What is an ideal? The formulation of a thought in the man's mind of what he would like to do or be. Something that he conceives as being near perfection, and his idea of perfection exists only in the branch about which he is thinking. Therefore, there cannot be a definite mental picture without some practical experience in that branch.

Take inflammation. It is a long word and a big subject, and while the essayist says that all diseases are inflammations, yet there is some doubt about it. If we should stand before our classes and make such a statement some inquiring mind would ask if we still adhere to the inflammatory theory of dental caries. Dental caries is a disease just as surely as is diphtheria.

Simplicity and clearness in expounding is the ideal toward which we should aim in presenting a subject to our classes. Simplicity and clearness and the use of plenty of good common sense. One definite idea is worth a lot of mixed up stuff. That one idea means a clear, concise presentation of the subject, and while I do not agree with the Doctor in his theory regarding inflammation, yet his idea with reference to formulating something for his class is praiseworthy.

It has been a great problem with me as to how we can stimulate the students to think independently. I know that the occupant of every chair, no matter in what branch or subject, has the desire to create the impression on his class that all knowledge coming from that chair has emanated from the individual occupying it. This is true of all teachers, both in dental and medical colleges. Yet they are simply teaching what they have learned from books plus their own experiences in actual practice. After you have talked to a body of students for an hour on some subject, perhaps abstruse, you will notice that here and there one is going to sleep. He is not interested; he cannot comprehend, and his mental inertness makes him drowsy and dull.

How do our teachers of grammar, geography and arithmetic instil knowledge? How do the literary colleges do it? Does the teacher go before his class and lecture, and let the boys get just what they can? No. He has a text-book on every branch he teaches, and he assigns a lesson from which he will interrogate, and which he will enlarge upon and explain. And thus, by leading the student mind into the proper channel, the habit of thinking is inculcated and good results are obtained,

Dr. Geo. E. Hunt, Indianapolis, Ind. The paper is excellent, but it does not contain much about teaching pathology. The essayist stated that every disease, no matter what its cause, is an inflammation; that pathology is only a discussion of inflammation. I cannot agree with that for a moment because there are many diseases that are not the result of inflammation, and other diseases in which inflammation is only a symptom. The man who teaches that pathology is inflammation is doing a great wrong to his students. And, as Dr. Hertig said, inflammation does not exist in caries of the teeth. To say that inflammation is pathology and that pathology is inflammation is wrong. There is not the least analogy between a general fever and inflammation, and yet the essayist draws one.

Let us run over the pathology of inflammation. The first thing that occurs is dilatation of the blood vessels with increased rapidity of flow in the capillaries. The irritation relaxes the vasomotor nervous system and allows the arteriole walls to dilate, thus bringing more blood to the part. The same cause results in dilatation of the vein walls, and the fact that more blood is brought to the part by the arterioles necessitates an increase of speed in the undilated capillaries. Does that occur in a general fever? Not at all. If all the veins and arteries dilated there would be no circulation of blood in the body at all. It would stagnate in the blood vessels of the body. Later there is an exudation from the blood vessels beginning in the smaller veins. The leucocytes collect on the inside of the vessel wall and finally make their way into the tissues. Does that occur in a general fever? No. There is no analogy between an inflammation and a fever, except that in the early stages of each there is an increase in the nutritive changes occurring in the part affected. But in the later stages of inflammation there is a diminishment, almost a suspension, of nutritive changes, resulting in coldness instead of heat. I think the man who attempts to teach pathology on the basis that it is inflammation and that inflammation is pathology is doing his students an injustice.

I regret that more was not said about the methods of teaching pathology. That is what I want to learn, because I teach pathology. I have fought, bled and died for the subject of pathology before this association for many years, and our late lamented friend, Dr. Barrett, assisted in laying out my remains at Chicago last year on this same topic. I have a course in general pathology so that when I take up the subject of pulp conservation I do not attempt to teach inflammation. The student is supposed to have learned that before. In fact, he cannot understand the subject of pulp destruction until he has learned all about inflammation.

Dr. G. V. Black, Chicago.

The teacher of pathology needs to have a clean-cut idea of the subject; what it is, what it is caused by and what it leads up to in the end. Pathology is made up of a set of symptoms following upon something. The principal points in pathology with which we meet in operative dentistry, if I should speak of it in that way, only including a part of it, begins for the most part with the pathology of caries, with an injury produced, which as a sequence brings finally an injury to the pulp of the tooth. We have an infection and an inflammation, possibly a suppuration, that extends to the apical end of the root of the tooth. And then alveolar abscess and all the sequences that may come from that whose origin can be traced to the primary caries. We can trace the conditions from one to the other, and in this way arrive at a clear conception of the course that has been run and the existing conditions, and be ready to apply the proper remedy. We cannot teach pathology by any course of reasoning except by following these sequences step by step as they occur, thus gaining a history of the .whole condition from its incipiency.

For instance: A few days ago a student came to me and said that he was not quite satisfied with a certain case. There is a swelling, supposedly an alveolar abscess, yet it did not present the usual evidences of abscess. I asked what were the conditions, the history of the case. "There are the molar teeth perfectly sound," said he, "and yet there is a swelling about the roots of one of them." I said, "Look further." There was one tooth missing. An exploration was demanded. It was made and the missing tooth was found below the roots of the other teeth. Here is an entirely different set of conditions. There was no alveolar abscess. By following up the conditions that presented themselves in the order indicated, by getting at the sequence of the trouble, we had no difficulty in arriving at a complete understanding of the case and the treatment was evident. That is pathology; having in mind the possibilities that may result or follow from a primary injury and in that way solving the problem.

Dr. Thomas B. Hartzel, Minneapolis.

Pathology is a pleasant subject to teach. In fact, no subject in the curriculum of our colleges today can be made more intensely interesting to the average student than pathology. No subject in the curriculum affords so wide and varied a field from which to draw illustration, and all of us know that no better method of teaching exists than that by which the teacher clinches the idea he has presented in the mind than by pointing out clear-cut analogies. For instance, the wonderful work done by one of the two classes of leucocytes chiefly concerned in the inflammatory process is beautifully illustrated and amplified by a close study of the process of production of antitoxin now so successfully used in the treatment of diphtheria, and here let me say that I find students most keenly alive to this sort of illustration. Not only does the subject of inflammation take on more interest, but the subject of immunity as wrought out by the leucocytes seizes for itself a place in the mind of the student that makes him an attentive listener, particularly when immunity comes up for discussion. I thoroughly agree with the essayist that it is most essential that the teacher should possess a clear-cut idea of the end to be attained. In fact, in order to teach pathology and make the subject vital, he must have a good general education in medicine and have served in the various capacities in the post-mortem room, the pathological laboritory and the general hospital; then only is he qualified with the illustrative material to make this subject interesting.

The essayist has made several points very clear, the most salient of which is the fact that inflammation is the foundation on which all pathological knowledge rests; that all disease is the result of some variation of the inflammatory process. This being true, our first task is to lay this foundation, and how can we best do this? I answer, by carefully following the laboratory methods of George J. Adam as outlined by him in his chapter on inflammation, written for Clifford-Abbot's System of Medicine, a résumé of which can be found in The American Text Book of Pathology, edited by Hectoen. It is deeply to be regretted that there has not yet been published a text book on pathology for dental students that is sufficiently comprehensive, and that is one of the reasons for some of the complaints we hear in regard to this branch. However, let us be inspired by a firm belief in the absolute necessity for intelligent comprehension of pathology to successfully practice dentistry. Educate our teachers to this view of the case and the subject will never lack interest.

Dr. Stubblefield. I see that I failed in transmitting the idea in my brain to the place where Dr. Hunt's brain ought to be, and I hope that he is not typical of the body that hears me. Now, Dr. Black presents the subject in a way that reminds me of a little game we used to play when children: You are cold or hot as you recede or approach. He says it is a sequence of changes, of structural changes; but dependent upon what? That was the idea I tried to present in my ideal. Please take the paper and digest it, and if it is not worth anything, why it is not the first effort that has proved futile and worthless. But I am going to keep on treating inflammation as the result of a cause, and the first essential rule is to remove that cause. The cause is either transitory or permanent. If permanent, its effects will be more or less permanent, and then you have this sequence of changes that Dr. Black detailed. If you remove the cause, resolution occurs. If the process goes beyond a certain point, nature cannot bring about resolution, and the changes continue until there is complete dissolution.

Dr. Hunt said that there is no analogy between a local inflammation and a general idiopathic fever. Does an analogy between two conditions depend on an exact conformation in all things? Cannot you conceive that the structure in which the inflammation occurs will modify the type of inflammation? I did not say that this ideal is perfect because it is an ideal. I told you that the ideal may be wrong, as well as the idea from which it sprung, but I still claim that they did not set up any objection to the acceptance of the ideal.

Dr. Hertig said he would be knocked down if he said that dental caries is an inflammation. What are the symptoms of inflammation? Pain, redness, heat, swelling and perverted function. Is a tooth perverted in its function when it has undergone the effect of an irritating cause in the way of caries? What do these patients come to us for unless to re-establish function? Does solution of continuity mean nothing? Is not the cause the irritation present, but because it happens to be a hard structure the result does not show itself in the usual manner? We do not expect engorgement of capillaries in a tooth, but essentially the cardinal symptoms are present in a modified form that is due to their environment.

"Ethics, Literature and Hygiene." Our New Chair.

By J. D. Moody, D.D.S., Los Angeles, Cal.

Realizing the need of a more extended study of ethical relations than is usually given in a dental college, this chair was established three years ago by the College of Dentistry of the University of Southern California. So far as we could learn, there was, at that time, no such course in any dental college. An occasional lecture or two may have been given, but no mention of such has been made in the announcements.

There are to be found two or three apparent exceptions to this statement in the announcements of the North Pacific Dental College, of Portland, Oregon, and of the Medico-Chirurgical College, of Philadelphia, Pa. The former unites in one chair, "Dental Jurisprudence and Ethics," but it is in charge of a legal gentleman. While he probably will bring out the legal phases of ethical relations, he certainly cannot enter into all the particularly dental phases of the question, as a dentist can. The other college does not enter into ethical questions at all, but it does present an elaborate and admirable course in hygiene. This course is well worthy of emulation by every dental college, but it does not present just those points which we consider of especial value.

One other announces a separate course in hygiene, but gives no details. Of course all colleges do teach more or less hygiene in some way, but it is in this practical, interwoven way of teaching it that we believe our plan to have the advantage.

It was also felt that the debt which we owe to our literature should have recognition, and this was added to the duties of the chair.

This was all virgin ground. We had no previous experience upon which to draw, no plans which might suggest other plans. We had to begin at the bottom, feeling our way as we went along. In the second year, owing to some professorial changes, hygiene was also added to this department, the title of which now reads: "Ethics, Literature and Hygiene."

In assuming charge of this work, the first problem which presented itself to my mind, was whether to plan for three separate divisions, or to weave them all together into one harmonious whole. The following solution presented itself:

By giving to the word "ethics" the modern, practical expression of man's relations to his surroundings, rather than the older and psychological one, I crystallized its meaning into the definition "Law of Duty." But the dentist's duty to—what?

That had to be worked out. Each year some alterations and additions have been made, and probably each succeeding year others will be made as suggested by experience, until finally it has assumed the shape we would have it.

Following is the course as it has taken shape thus far:

Ethics.
Outline of Course.

Definition—"The Law of Duty."

The dentist's duty to Self, Office, Patients, Profession, Dental Societies, Society (in general).

Literature.

General: Library, Magazines, Papers. Dental: History of Library Journals—How chosen, How read, Writing for.

More than one-half of the time allotted is given to the consideration of the first part of this course.

These different subjects are taken up in turn and elaborated in detail in such a way as to give the class a high ideal as to the dentist's personality, his position in society and in the profession, and his duties thereto.

Throughout all this course, illustrations from actual practice are constantly introduced to emphasize the special points made.

Duty to Self. The first section, "Duty to Self," assumes the need of a healthy body and a healthy mind as a prerequisite to a successful professional career, and outlines how to keep the one by the use of proper food, by proper exercise, occupation, rest, and personal hygiene, and the other by proper mental food, activity and associations.

The make-up of a modern dental office, in the four-fold phase of furnishings, equipment, convenience, and sanitary methods is fully illustrated.

The management of a first-class practice is explained in all of its details, including both the work done, and the relation between dentist and patient. This last point is especially considered, holding up before the class the ideal dentist, a gentleman always, sympathetic, firm, master of his position.

It was not considered wise to enter upon an elaborate course in general hygiene for the present, but hygienic principles and methods are so interwoven through all these studies as to emphasize their importance, and to impress upon the student the absolute necessity for their observance. This is found to answer every purpose, and in the light of our present experience we believe it to be the best plan.

The relation the dentist should sustain towards the profession and to the dental society is looked at from every standpoint; the students are urged to cultivate a spirit of professional pride, and shown how to make the most of their new relations. The ethical spirit receives especial emphasis in this section.

Dental Societies. They are shown how much they need the dental society and how much the society needs them. The organization of a society is explained, and they are taught how to conduct one. They also receive instruction in writing papers for it; how to go about it, choosing the topic and why; what to include and what to exclude. The free and easy habits and expressions of the local society are contrasted with the dignified statements of the scientific or literary association, in such a way as to impress them with the importance of concise speaking and writng.

Dental Journals. Dental journals are taken into the class, and attention called to some article which exhibits redundancy, or irrelevant matter that should have been omitted. Verbosity, and a loose mode of expression are contrasted with terse and exact language.

The printed discussions of some society are taken up in like manner, and hints given towards preparing such for publication. The ethical questions involving speaker or writer, publisher and reader, are brought out and considered.

College Society. To make all this the more practical, the senior class in each year is organized into a College Dental Society, which meets once a month, and carries on its work the same as any dental society. The jurors are invited to be present at these meetings, and in some ways to take part, thus being prepared to take up the management in the senior year.

Some of our meetings the past year have equaled in interest many of those of our more pretentious societies.

I am present at every meeting of this society in the capacity of a critic and counselor. If they are perplexed as to any procedure during the meeting, I help them out, and at the close I review the work and discussions of the evening, criticizing freely, just as a teacher would a class.

Literature. Under "Literature" an attempt is made to instill into their minds, as professional men, a love for literature and literary associations. They are taught something of the history of dental literature, biography and art. They are counseled in regard to the selection of a dental library, when and how to acquire one, what books to purchase and reasons given therefor. The dental journals are likewise considered, their merits or "field" canvassed, and advice as to a selection given.

This is but a mere outline of our work, but it shows something of what we are trying to do. We believe there is nothing like it. We believe that in a few years' course, this department, if generally adopted, would develop into one of the greatest factors in the upbuilding of our profession.

The Value of Instruction in Dental History and Literature.

By H. L. Ambler, Cleveland, Ohio.

The subject of teaching History in Dental Colleges is well worthy of our sincere consideration, because it will naturally stimulate students to want to know more of their profession's past; it will make them desire to attend societies, subscribe for journals, purchase books and read them; any or all of these may lead to the conception of ideas which will be valuable.

Teaching history affords the main opportunity for students to know of and appreciate the science, evolution and progress of the profession, and will create in them a wish to learn more of collateral branches, and this will lead to fondness for good literature in general, and make them better citizens, because they will have broad ideas, and it will also make dental graduates equal to graduates in any profession.

Teaching history is favorable to producing scientists, because it tells of what has been done, and how it was done, thus stimulating the mind of the hearer and prompting him to emulate some of the noble characters spoken of—it imbues him with enthusiasm, and he will aspire to great things.

If you impress the minds of students with history, they will have a higher regard for the status and dignity of their calling, and the impressions they will make, and the influence they will have on their fraternal brothers, and also on the laity, will redound to their honor.

History should help to guide students and to stimulate effort along lines of invention and discovery, and those who study it will naturally assist in making it.

It is for the intellectual and material benefit of the student to study history, because it makes him intrinsically greater, wiser and better, and teaches him to honor the memory of notable men.

History of the best things tends to do away with quackery and empiricism, ignorance and error, and increases our resources.

Teach history so that students may know what was done in ancient times, and where dentistry originated, and when, and by whom important discoveries in our specialty were first made, and what dentist discovered practical anesthesia, or made certain surgical operations, or applied certain mechanical principles, or wrote the first books on our specialty. One cannot be progressive without knowing more or less of history, because he might be going backwards in trying to develop some idea or material thing which had become obsolete before he entered the profession.

In order to fully understand the steps which have been taken to bring dentistry up to the present standard, one must study history, which is one of the factors that helps mold dentistry into a profession.

With the dental student, who is longing for information, everything that has to do with the history and progress of dentistry, is studied with interest, especially the rise, fall and revival of dental art; he must learn of the origin of the science and art, or he cannot determine its progress or appreciate its advancement. He should be made to feel that he owes much to those who made dentistry a profession and invented methods and instruments which he will use daily, the products of which are a necessity in every community.

The student should be taught history so that he will understand that he does not know everything, and is not in advance of all of his predecessors, but that some of their work has been relegated to him for completion.

You can interest students by occasionally giving short biographical sketches of some of our most noted men.

There is no longer any excuse for not teaching this subject as we have a text book, and also four college years of not less than seven months each, in which time can easily be provided.

History Taught in Professional Schools.

No other of the learned professions omit such instruction. What would be thought of a theological school which would plunge its students headlong into the dogmas of its particular sect without first dealing with the history of religions? Such a school would be very narrow, indeed, and yet gauged by the same rule, dentistry is more narrow than theology. What would be thought of a law school which did not teach the history, emanation and foundation principles of law? Such a school would probably give a student, by way of introduction, a case to "try."

What would be thought of a medical school which did not tell its pupils about Esculapius, Hippocrates, Galen, Hunter and others? Such a school might give a freshman a case of typhoid fever to treat.

Schools of painting and sculpture go back to ancient and medieval times for their history and ideal types.

We believe that if every college would provide for a reasonable course of instruction in the history of dentistry, showing how it has gradually evolved a literature vast and comprehensive enough to occupy all the attention of any one mind, that our specialty would be broadened because of the knowledge thus disseminated.

Value of Teaching History.

History shows that our profession is on an equality with several other professions, and gentlemen in these professions should treat each other in a noble manner, and in accordance with their scientific attainments.

Students should learn that dentistry has a record which they need not be ashamed of, and a literature of its own which is receiving large yearly additions; also that highly educated men of the past and present are engaged in its practice; knowing this will be a great factor in causing pupils to strive with all their powers to be a credit to their calling.

History induces in students, respect, veneration and love for their work, and impresses more than ever upon them that it is a profession.

The profession should honor the man, and the man should honor the profession, and this will be more apt to be done if pupils are told about the good things of the past as well as present. They should be taught so that the world at large will consider them as well equipped in their profession.

as any other man is in his; thus he will gain standing, prestige and influence, which will be of incalculable benefit.

Some of the antagonism which has been shown towards our profession, has been directed to lack of proper literary training.

They should be taught so that they may be able to defend themselves from the attacks of those who do not appreciate the large amount of study, work and experiment which has been given for the purpose of relieving pain, preserving and restoring organs of the body, and adding to the longevity of the human race.

History helps put a man in his true position for future usefulness, and it is impossible to keep abreast of the times in this inventive and progressive age, without at least knowing our present and passing literature.

"The thoughtful reasoning reader will find a mine of value in history, and mentally add to his storehouse of information laid aside for the future, and the use which is made of this knowledge will depend upon the individual; one finds pabulum for future essays, another will find hints which lead him to deeper investigation and original productions."

One evidence of progress is the ever increasing interest manifested in historical research and study of collateral branches, and the profession is gradually comprehending that the proper way to learn lessons of wisdom for the uncertain future is, to give immediate attention to the events of the past. If we remain ignorant of the history of those who preceded us, we are liable to make many sad mistakes. Another evidence of the fact that history is attracting more attention than formerly we note that the National Dental Association has appointed a committee of twelve on this subject, and the "Southern Branch" has also a committee, and at their last meeting Dr. G. S. Vann, in his paper said: "A chair of dental history and ethics should be established in every college so as to develop a nobler strain of professional life."

Other evidence is that several of our colleges already teach more or less of the subject.*

"Teach history so that pupils may realize how deep down into the soil of history run the roots of the life that flourishes in the profession. Here great events have happened; here great deeds have been done; here great men have lived and flourished and labored; here the fascinating story of the growth of the profession is told."

History teaches that the dental spirit is one of unrest, full of anxious brain power, continually reaching for something better, coupled with nimble fingers, bright eyes, good judgment and perseverance, and the watchword is, and ever must be, onward toward perfection.

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*Colleges which teach dental history: University of Illinois, Prof. B. J. Cigrand; Philadelphia Dental College, Chas. McManus, D.D.S.; Louisville College of Dentistry, Max M. Eble, D.D.S.; University Southern California, J. D. Moody, D.D.S.; Western Reserve University, Prof. H. L. Ambler; Barnes, St. Louis, Dr. B. L. Thorpe.

Discussion.

Dr. C. McManus, Hartford, Conn.

Dr. Ambler has covered the ground so completely that I feel that I can add very little of value to the discussion of this interesting subject. It is certainly gratifying that a body of teachers should consider it of sufficient importance to give it their attention at this time, when our colleges are about to begin a four years' course, and the former valid excuse of lack of time for its proper consideration can hold good no longer.

In the four years which the future dental students will spend in getting their professional training there is certainly ample time for what Dr. Ambler has conservatively termed "a *reasonable* course of instruction." It is not necessary that every dental college should have its "Professor of Dental History and Literature," nor that an exhaustive series of lectures should be given on these subjects, but I feel that the college of the future will not be doing its full duty, if it continues to entirely neglect such a means of broadening the professional character of its students.

Dentistry is not alone in the neglect of the study and teaching of its history—we stand side by side with medicine in that respect. Over thirty years ago Duglison speaks of students being "left to gather their information on the previous state of medicine in whatever manner they may find it practicable or convenient to do so after graduation."

Twenty-five years later Dr. Roswell Park, of Buffalo, writes: "The history of medicine has been sadly neglected in our medical schools." Thirty years ago the great Virchow wrote "that the scientific knowledge of young physicians reaches only three to five years back."

Braatz says that "the history of medicine was taught as a regular branch in fifteen German-speaking universities many years ago, but it is kept up now in only one or two. Nevertheless," he says "the medical graduate needs the story of the past in order to appreciate the present, to uphold the traditions in professional ethics and for many other reasons," and he pleads "that this instruction should not be neglected."

Duglison's "History of Medicine" was the outcome of a series of lectures delivered many years ago before the students of the University of Virginia and Park's volume was the result of an attempt to give systematic instruction to the classes at the University of Buffalo. Dr. Park says that it is a source of the greatest satisfaction to him that his sincere hope has been fulfilled, in that the profession generally are now manifesting a deep interest in this important subject. I simply state these points as an evidence, that not only in past neglect, but in present interest, we are closely in touch with our old friends of the medical profession, not only in this country, but in Europe.

Properly presented to the student, the history of the profession and its literature, has a very *practical* as well as an ethical value.

Dr. Black struck the keynote of the whole matter when he said that "a history of dentistry should be, not a history of men but a history of ***the progress of thought*** in dentistry."

Carrying out this idea the students could be guided, by the teachers, in their reading and sent to the college library, and museum, to follow up, through the old books and journals, and by the study of the instruments and appliances of former days, the development of modern dentistry. It could not fail to interest them as they would come upon so many old ideas that would seem to them so new—and be made to realize that some of our modern devices are so old.

In this way—a sort of laboratory method of studying history and literature—they would be getting their information in the "original package" and would not be in so much danger of "knowing so many things that ain't so"—to quote that eminent philosopher, Josh Billings.

Dr. Ambler has said, "If you impress the minds of students with history they will have a higher regard for the status and dignity of their calling."

It is here that a proper consideration of dental biography may have its lasting ethical value in forming true professional character.

Dr. S. G. Perry has beautifully said: "I am impressed with the thought that we have a great deal to be thankful for in being members of a profession that can make such an array of names of men who could grace any calling on this earth at any time and it is proper that we should stop to historically consider these men, and that we should occasionally lay aside scientific questions to think of these things that really touch the heart so deeply."

It is this practical and ethical value of instruction in our history and literature that makes it worthy of the attention of all having a true interest in dental education at heart.

Dr. B. J. Cigrand,
Chicago, Ill.

The dentist who is ignorant of the beginning of his profession and is not familiar with the trials of the early forefathers is not unlike the patriot who glories in the triumphs and achievements of his native land, but knows nothing of the making of the established institutions he so blindly loves. The dental student who acquires a knowledge of the evolution of his prospective profession, will be more likely to cherish more dearly the heritage bequeathed by the giant minds who laid its broad foundation. In fact, if the students were required to study the biographies of the founders of our calling they would recognize the merit of self sacrifice and devotion of the pioneers and would more keenly appreciate the honor of the conference of the degree of Doctor of Dental Surgery. If the students understand the heroic efforts made by men like Hayden, Harris, Hudson, Gardette, Randall, Wells, Townsend and Wescott, and study the careers of such distinguished educators as McQuillen, Cushing Garretson, Allport, McKellops, Taft and Barrett, they would scorn the fellow classmate who would dare to violate the code of ethics and despise him who aims to commercialize every feature in the noble purpose of our vocation. The study of the biographies of even such of the living as Black, Williams, Miller and Marshall would contribute liberally towards establishing in the minds of the students a sense of reverence and respect. I quite agree with the famous Englishman who said that "the history of any nation is but one of biography of its great men." It is equally applicable to the history of a profession, and for this reason I have during the past eight years given a special course of lectures on the biographies of the individuals who have laid the basic structures of the science and art of dentistry. Besides the course includes a clear résumé of the origin, development and present standing of the various dental bodies, thus familiarizing the students with the purpose of the dental societies and associations, and emphasizing the importance of identifying themselves with dental societies calculated to broaden their knowledge of dental procedures, and assisting in the great work of constructive gatherings.

I believe it was Lord Bacon who said, "Every man is a debtor to his profession," and he certainly was correct, hence let us contribute our quota to the great cause and a certain method, promissory or begetting love of profession can be found in the study of the history of our profession. Through this channel we can improve the minds of our student body and inculcate a desire to emulate those who have so cheerfully toiled to make ours a dignified calling.

J. H. Kennerly,
M.D., D.D.S.,
St. Louis, Mo.

Goethe, in his fundamental work on education entitled "Wilhelm Meister," expresses the thought that to understand one's profession thoroughly it is necessary to know its history. The very significance of this aphorism is self-evident. The struggles and strifes of the forefathers of our profession for the development of the unknown factors which govern the routine work of a successful dental practice are not alone interesting from an historical point of view, but by their study we give to our own mind and that of our students' the power of cultivating logical reasoning. The inventions and discoveries of the various appliances of our armamentarium are of immense benefit for the rapid execution of our daily work, and a knowledge of the various steps which were instrumental in bringing them to the present point of perfection is of still more importance, as it will prevent the so-called discovery of methods, which have been cast aside, and on the other hand, form a solid guide-post for the progress and development of procedures which are still in their infancy. Further, if a closer acquaintance with these facts were generally to be found amongst the profession, many of the costly lawsuits involving new fangled ideas in regard to the construction of a certain crown or bridge, could be quickly and successfully averted by simply referring to historical data obtained from existing literature. The celebrated lawsuit Allen *vs.* Hunter (Continuous Gum) and the Goodyear vulcanite case, will be remembered by many of those present. On the other hand, by the study of the history of a profession, a discovery, invention, or the performance of a certain operative method, is more certain to be credited to its rightful originator. To illustrate this particular point more fully let me cite to you the following interesting bit of history:

Work of Early Dentists.

In 1851 Dr. S. P. Hullihan introduced an operation which in dental history is known as Hullihan's operation "Rhizodontypy." It consists "in making a hole through the gum, the outer edge of the alveolar process and the root of the tooth into the nerve cavity and then in opening the blood vessel of the nerve? While this operation had been already practised by Hunter and Fox, a closer study of the works of the Latin medical writers reveals the fact that Archigenes, who lived about the year of 100, used "a small trephine to drill into the middle of the tooth to relieve the pain" from a dead pulp. The same operation was much lauded by Pliny, the older, who, however, to obviate the pain arising therefrom, advocated the use of a local anesthetic, the *"lapis memphiticus,"* a stone somewhat similar to onyx which was powdered and mixed with vinegar and then spread over the affected part. Again, the question when and by whom were the first gold fillings placed in teeth, is extremely interesting from an historical point of view.

In one of the later American works on dental history, the following statement is found: "One of the mummified bodies of an Egyptian Pharaoh demonstrates most conclusively that natural teeth were not only well cared for in the way of gold and lead filling," etc., quoting as an authority the *Papyrus Ebers*. As a matter of historical fact we would like to state in Joachim's authorized translation of the Egyptian Hieroglyphics of the *Papyrus Ebers*, no such statement can be found. On the contrary, the late Professor Ebers writes in a private letter in 1895 to Dr. Jacobi, of Frankfort, as follows: "In spite of the minutest investigations in regard to the filling of teeth in the mummies of Egypt, I can only record negative results." The celebrated craniologist, Professor Emil Schmidt, of Leipzig, who possesses several hundred crania of mummies, adds to it thus: "In no one denture did I find anything that could be traced to the work of a dentist—no filling, no filing nor preparation of a carious defect; no artificial dentures." In 1728, Fauchard published the first edition of his work, *The Dental Surgeon,* and he is the first authentic author who gives a definite description of filling teeth with metals, employing tin, lead and gold. However, gold fillings are mentioned long before this work of Fauchard appeared, *e.g.,* in the writings of the two Italians, Vigo and Arculanus. Giovanni da Vigo, the Genoese (1460-1520), was connected with the medical school in Padua. He writes quite at length about the extraction of teeth, being bitterly opposed to the performance of this surgical operation *"In publico banco vagabundis charlatanis."* He advises the use of arsenic and sublimate for the treatment of old fistulous openings, and merely mentions the possibility of filling a tooth with leaves of gold. Da Vigo's work appeared in Latin in 1514; an English translation of this surgery was published in London in the year 1550. Giovanni d'Arvoli, or as he styled himself according to the uses of learned men of his time, "Johannas Arculanus," was a professor of medicine in Bologna, dying in 1484.

The Teaching of Dental History.

The teaching of dental and medical history in the colleges and universities is still in its infancy. While there is in some European universities a special chair of medical history, as for instance in the University of Berlin, the United States has been rather slow in recognizing this important subject. The University of Maryland is at present the first and only institution which has a regular professorship of medical history incorporated in its faculty. As we are informed, Dr. McManus, of Hartford, Conn., has delivered a series of lectures relative to dental history to the last year's class of his Alma Mater, the Pennsylvania College of Dental Surgery. Dr. B. J. Cigrand also fills a chair on this subject in the Dental School of the University of Illinois. These are probably the only three known courses of lectures on dental or medical history in the United States. In the other schools, the various professors usually refer to the history of their relative subjects in an introductory lecture, or during the progress of the course. Concerning the literature of this extremely interesting subject let me say just a few words. As far as I am informed there are only two works in the English language which teach dental history and they do so in a somewhat hasty manner. The first and most important is the history of dental and oral science in America published by authority of the American Academy of Dental Science in 1876; the other, entitled "The Rise, Fall and Revival of Dental Prosthesis," by Dr. B. J. Cigrand, of Chicago, Ill. There are still others which might be mentioned, namely, "History of Medicine," by Parks, and the English translation of the German work of Herman Peters entitled "Pictorial History of Ancient Pharmacy," and the "History of Medicine." All are extremely valuable. Dr. Jacobi, of Frankfort, Germany, has published a little work entitled "History of Dentistry," a very interesting book of great value, although somewhat limited in its scope. There is another work published in the French language, which, while of value, deals primarily with dental history in France. As a guide to the literature, the late lamented Dr. Taft, who was primarily selected to read a paper before this body, has compiled an index to the periodical literature of dental science and art as presented in the English language and "Sternfeld's" dental index are very useful and important works. Dr. McManus has published important personal sketches of the forefathers of our profession. Dr. A. H. Fuller has also published an interesting paper on the same subject. Dr. Wm. Trueman, of Philadelphia, has contributed largely to the general dental history in the various journals, and a series of personal sketches of the older men of our profession has appeared in the *Dental Review* by Dr. B. L. Thorpe. The older dental journals and text books furnish an abundance of valuable information, and it is to be hoped that some of our able men like Drs. McManus and Trueman will in the near future furnish us with a more complete history of the dental profession.

Dr. Burton Lee Thorpe, St. Louis, Mo.

Until within the past few years our profession has paid little attention to its early history. I doubt if any other profession has as meager knowledge of its origin as ours.

In our college we consider dental history an important branch. In my course on this subject I begin with a review of the subjects appertaining to mention of dental operations B. C., following with a review of the theories and methods advanced by Fauchard, Chemant, Celus, and John Hunter, who enters at some length into details of tooth development, theories on caries, inflammation of tooth tissue, and suggestion on treatment.

Le Merle's *"Histoire de l'Art,"* and G. P. Geist-Jacobi *"Geschichte der Zahn-hul-Kunde"* works are worth reviewing; also the works of Joseph Fox, Alex Nasmyth, John Bell, Leonard Koecker, Duval, S. Fitch and John Tomes' Lectures of 1848. Chapin A. Harris, while editor of the *American Journal of Dental Science,* contributed many articles of historic and scientific value to that journal and did future teachers a great benefit when he translated and published in his journal the works of Baume—*"Treatise on First Dentition."* Garrot—*"Diseases of the Mouth."* Jobson—*"Treatise on the Anatomy and Physiology of the Teeth."* Lefoulon—*"Theory and Practice of Dental Surgery."* Delabarre—"*Second Dentition.*" Blandin—"*Human and Comparative Anatomy of the Dental System.*" Desirabode—"*Elements of the Science and Art of the Dentist.*" Jourdain—"*Diseases and Surgical Operations of the Mouth.*" Besides valuable treatises such as Berdmore, "*Treatise on Disorders and Deformities of the Teeth and Gums.*" J. Waits, "*Facts Connected with the Teeth.*" Blake, "*Structure and Formation of the Teeth in Man and Animals,*" and T. E. Bond's "*Practical Treatise on Dental Medicine,*" all of which give interesting points for a course on history. To briefly review the various theories and modes of treatment of these authors, to briefly take up individually, from a biographical standpoint, the characteristics, theories, methods, inventions, literary contributions and professional attainments of the many good men who helped to build our profession's superstructure, and who are the real makers of dentistry is of more than passing interest. These lectures are made more interesting by illustrating with lantern slides.

The three most potent factors in our profession's history, from an educational standpoint, are the college, the journal and the society. The origin and work accomplished by each should be reviewed. The early volumes of the *American Journal of Dental Science, Dental Register of the West,* and *Dental News Letter,* and other of the early journals will give much information of interest. The committee on history for the Fourth International Dental Congress are attempting a work which, when completed, will add much to dental history, viz.: the gathering of data making a complete report of the organization and work accomplished by each dental college in the United States.

Each college should furnish, as soon as requested by the committee, a brief, concise account of all historic data connected with the organization and following events of interest. Someone has said: "Who knows not another language cannot understand his own." To properly appreciate just what we are we must first realize what we were. The National Dental Association, Committee on History, has done much in the past few years in exciting interest in this very important subject and deserves financial aid to successfully carry on and complete this work. The history of dentistry cannot be written in a day or by one man. The systematic cooperation of all who are concerned in historical matters is needed, that, by united effort we may rescue from oblivion many important facts that, when properly compiled, will give us an *absolutely authentic history.*

The efforts, along this line, of Wm. H. Trueman, Jonathan Taft, B. J. Cigrand and Chas. McManus deserve especial commendation.

Now that we have a four-year course and plenty of time to teach this subject there is no reason why a chair on dental history and literature should not be taught in all colleges. To know and appreciate the events of our infancy and growth and the attainments of the men who are a composite of dental patriot, pioneer and pathfinder is both instructive and of lasting benefit to the student.

Dr. G. V. Black, Chicago, Ill. This is a subject in which I am deeply interested, and I would like to see it pursued more closely in the future than it has been in the past. We have a great deal to do in the searching out and tabulation of data on this subject. We seem to have lost sight of the literature of the past, and our students know little or nothing of this literature. In our present college course we have not the time to give them a proper résumé of the subject. There are many things that could be given to the student with reference to dental history that would be of interest. For instance, the oldest data I could find with reference to gold filling was in a German book, published about 1530. The author seemed to understand the filling of teeth with gold and he quoted from others who wrote considerably before his time. This, so far as I know, is the oldest printed record of this operation.

I am sure that with proper search and going over of old books we may go still further back and find data of great importance to an understanding of the development of thought upon this subject. For after all, while the history of man is important and interesting, the great point is to arrive at the development of thought along these lines.

Dr. R. H. Hofheinz, Rochester, N. Y. I have been very much pleased with this paper. I always feel sorry that I can give my students but a short history of dentistry owing to lack of time. I believe that there is no one thing that will stimulate the ethical feeling of the student so much as this matter of dental history. As one speaker remarked: "What does patriotism depend upon?" It depends largely upon the history of the nation. It depends largely upon the reading of and knowledge of that history by the people. It is exactly the same in dentistry. If our students lack that patriotism for dentistry, which they must get largely through this learning of history, they are lacking one of the most essential points necessary to success. Dr. Patterson, in his paper at the beginning of this session, spoke of the lack of ethics in schools. I do not believe that there is any other subject that will produce better ethics than the teaching of dental history.

I do not agree with Dr. Thorpe that history should be taught exclusively in the fourth year, because the sooner you develop this feeling of reverence for our science the better you apply the teaching of history. I believe dental history should be taught to the freshman classes because at that time they need as much ethical training as ever afterwards. It will bear repetition in the senior year. It should be made more interesting by biographical sketches because these are entertaining, but when the course is repeated in the fourth year the biography should be secondary.

I am very sorry to know that so little history is taught in our dental schools, and also that the German universities have given up the teaching of the history of medicine. Of course, there is some difference. The history of medicine is well established. It has been taught for centuries. But dentistry is too new to have a well established history. Such men as Trueman, Black, Willmott and others should contribute to history by writing their biographies, so as to stimulate the coming generations in their admiration for what has gone before them.

Dr. Thorpe. Dr. Hofheinz misunderstood me. I did not intend to say that dental history should be taught only in the fourth year. I said that now that we have the four-year course there was no excuse if we do not find time to teach dental history. Another point I omitted was the use of the lantern slides showing the various appliances used in the past, and also photographs of the pioneers in dentistry.

Dr. J. B. Willmott, Toronto, Can. I wish to give expression to two thoughts with reference to the history of dentistry. I heard no mention made of a work entitled *"History of Dental and Oral Science in America,"* published as part of the Centennial celebration of 1876, edited by James E. Dexter, of New York, and published by the S. S. White Dental Manufacturing Co. I purchased a copy of it and was delighted with it. In the absence of a systematized course on history this work furnished the teacher of operative and prosthetic dentistry with much information as to the development of practical dentistry.

One matter of special interest is the history of the "amalgam war." It greatly helps the student to understand the proper position of amalgam as a therapeutic agent.

Another point I wanted to make: The authorities of the corporate body of dentists of the Province of Ontario have sent out circulars to all men in practice previous to 1870, asking them to furnish a biographical sketch of themselves; the kind of instruction they received in dentistry, and the conditions under which they entered upon the study and practice of dentistry; giving some idea of the practice of dentistry as carried on at that time. We received responses from about thirty undertaking to furnish us with information. I think these thirty papers will give us a fair basis on which to start a history of dentistry in our Province.

Dr. G. V. Black. I want to say another word about the tabulation of data. About four years ago, acting on my advice as a means of studying dental literature, my son, Arthur, set about making a card catalogue of dental literature. He has run well up into the last century and has some thirty thousand cards of this catalogue completed, thus furnishing us with a ready means for looking back upon any point in the history of the profession. This should be done not only by one man but by hundreds of men, and it has been a question in my mind whether we could organize a system of card cataloging that would take in, perhaps, as many as have considerable libraries, or as many as read carefully and closely and are interested in the subject. There could then be an interchange of cards. We would get at exact data, and in a form in which they could be transmitted and yet be of very little expense to anyone. I throw this out as a possibility of the future, and I hope that some of you will take it up.

Dr. W. S. Bebb, Los Angeles, Cal. In the University of Southern California we have had a chair of literature and ethics for three years. I believe that the influence of this work is felt, from the fact that in our district out of 170 eligible members to a dental society, 140 belong to the Southern Californian.

Dr. Willmott. Some years ago, in connection with our college library, we undertook to get up a card index of five of the leading dental journals. We commenced from the date of Dr. Taft's index and indexed the five journals very minutely so that we can refer to any writer or subject that has been discussed during these years. I shall be very happy to extend the courtesies of our library to any member of this association.

Dr. Ambler. I wish to correct two or three statements made by those who discussed my paper. One gentleman said that the first time that dental history was taught was about three years ago. That is a mistake. The first teacher and the first college to teach dental history are located in Chicago. Dr. B. J. Cigrand first began to teach dental history about nine years ago. He is the pioneer.

Another statement was made that there are only three colleges that taught dental history. I have a list appended to my paper of seven schools that teach this subject, and I feel confident that this does not include them all because I did not have all the catalogues of the dental schools of this country.

I fear that I have written rather a tame paper because no one has found any fault with it, yet I feel grateful for what was said because I have learned much from the discussion.

Porcelain Technology.

By Hart J. Goslee, D.D.S., Chicago, Ill.

Although the primitive, practical and successful application of porcelain, or of the ceramic art, to dentistry, probably antedated the advent of dental colleges, and while it is true that the subject has occupied a place in the curriculm of a majority of the well equipped institutions since that time, still it is only within a comparatively few years that it has been regarded other than as being a distinctively separate, and, in most instances, perhaps unimportant part of the course of instruction, and hence it was generally taught accordingly, or, at best, in a more or less perfunctory manner.

This attitude, however, may be accounted for by the fact that a successful application of this particular class of work was then and has been generally regarded as demanding so high a degree of special fitness, and that it further encompassed a field of usefulness so restricted by limitations as to offer but meagre opportunities—pecuniary or otherwise—for the average practitioner of that time.

For these reasons, and since its application was thus for so long a time confined exclusively to the construction of continuous gum dentures, the restricted growth of the art and of the development of its possibilities naturally has led to the slow process of evolution experienced.

The Old School. To the work of John Allen, Moffett and Ambler Tees, of Close, Haskell, Beauman and a few others, who represented and who still represent what might properly be termed the "old school" must be attributed the inspiration and stimulation which have encouraged the recognition and development of these possibilities.

Indeed, such credit is due to them as to make it entirely unbecoming in me to pay tribute to their efforts and perseverance. And yet, if you will indulge me in prefacing this subject with a retrospective preamble, I desire to submit that we as teachers, in the present period of progress, must not overlook the conditions and difficulties under which their efforts were made, nor fail to acknowledge that the energy, perseverance and enthusiasm displayed by them has made it possible for those of another generation to comprehend and appreciate the value of their contribution to this evolution.

The esthetic and hygienic advantages which they early recognized, and which made the application even within such a limited field so preeminently successful, gradually promoted the realization of a greater scope of possibilities than they probably ever anticipated, and created a desire for the achievements which a more general and extensive application to fields of even greater usefulness would afford.

The New School.

As this appreciation increased, others became encouraged and enthused, and thus the process of development was marked by the advent of what we may now term the "new school." The apparently radical statements of Land, Parmley Brown, Jenkins and others were accepted by some, and a few worked earnestly with these men in the further development of such possibilities as they predicted; but the great majority were either skeptical or indifferent, or else belonged to that class whose more or less ultra-conservative views and tendencies caused them to regard such claims as being those of the "faddist," and such efforts as being only those incident to the promulgation of a "fad."

The stimulus engendered by the efforts of these enthusiasts, however, and later on by those of one or two in the East and of a handful in the West—principally in Chicago—has resulted in the development of porcelain work to such a general application and to so high a degree of esthetic perfection as to firmly establish it as an *art* which is undoubtedly destined to occupy a permanent and conspicuous place in the practice of modern dentistry.

This advancement has been made possible to a large extent, it is true, by the increased and constantly improving facilities and products which are furnished by the manufacturers; and yet, as a matter of fact, and without any desire whatever to detract from the credit due them, these increased facilities which are now at our command and which have so materially aided in perfecting and expediting the procedure, have been furnished to us very largely as the outgrowth of suggestion and demand on the part of the profession.

Like all new departures and methods, the application of porcelain work has been abused by indiscriminate and injudicious employment. This, however, is only a natural sequence, and is due to the fact that *judicious employment* can only follow a well defined familiarity with the requirements and limitations, and that these can only obtain as the direct results of the acquirement and development of skill.

Duty of the Colleges.

Hence, if the modern application of this class of work to the filling of teeth and to the construction of crown and bridge-work is generally acknowledged as being practicable, which is now conceded, and if it is then in turn acknowledged that *successful employment* is dependent upon a definite knowledge of the fundamental principles and requirements and upon the acquirement and development of *skill, then*, the dental college of today must do its *duty*—toward itself, and the student body and toward the advancement of the higher esthetic attainments of the profession.

If this be logical, then the teaching of porcelain work in a broad and comprehensive manner, so as to include the various phases of its present successful application, has now become a necessary and important addition to the dental curriculum.

Just what a thorough course in the technology of the subject should embrace, just how much time should be devoted to it and how it may best be elucidated is doubtless a matter which will work out its own salvation, and which is largely dependent upon the views and experience of the individual teacher and upon the environments of the college.

All teachers will, of course, agree with me in the value of technical training, as well as in the necessity for didactic instruction in the elucidation of principles. It is my opinion, however, that such didactic instruction, whether it be given by the chair or by the demonstrator, should either precede the actual technic work of the course or be given simultaneously with it.

While I know that the question as to whether the instructor of technics in the exercise of his special province as a teacher should deliver lectures upon the principles underlying any class of practical work is regarded as being unsettled, still it is my opinion, based upon experience, that the student should not be allowed to work in the dark, but that he should have an idea of why he is required to observe certain specified details before he is expected to attempt their execution. Unless he has this advantage he works practically as an automaton, and hence will invariably fail to appreciate the importance of exactness in the execution of minutiæ and detail.

In accordance with such a view, the course in porcelain technology, which I herewith briefly outline, is one which is now being given in the college with which I have the honor to be connected. It will be noted that an effort has been made to arrange it in a more or less systematic and sequential order, and to have it encompass a range sufficiently broad and practical as to enable the student to become adequately familiar with the details of procedure *out of the mouth* to an extent which will at least insure their subsequent more or less successful application in the mouth.

Didactic Instruction.

In connection with the didactic instruction, and irrespective of whether this instruction should come from the chair or from the demonstrator, the course should be inaugurated by lectures upon the fundamentals of the subject arranged and classified as follows:

First—The history and development of the porcelain art.

Second—The composition, characteristics and manipulation of porcelain compounds.

Third—The sources of heat production employed.

First—The first consideration embraces the history and development of this work which may be made materially beneficial to the student as a means of placing his mind in a receptive condition for further enlightenment, as well as to increase his appreciation of the requirements and underlying principles.

Second—The consideration, under the heading of the composition, characteristics and manipulation of porcelain compounds, would embrace:

1. *Composition.*
    - The ingredients used.
    - Properties imparted by each.
    - Method of compounding, etc.
    - Tinting, coloring, etc.
2. *Characteristics.*
    - Texture.
    - Density.
    - Strength.
    - Fusibility.
    - Shrinkage.
3. *Manipulation.*
    - Mixing: Trituration, consistency, etc.
    - Building: Packing, evaporation of moisture, etc.
    - Carving: Occlusion, anatomical outlines, etc.
    - Fusing: Tests, shrinkage, vitrification, color, porosity, etc.

Third—This portion of the instruction, which we have designated as "sources of heat production," should include a consideration of the various kinds of furnaces now employed; the manner in which they should be used and how they may be repaired; and the precautions incident to placing the work in and removing it from the muffle—heating, cooling, etc.

This preliminary didactic course should then be followed by a course in the technic laboratory, which should be sufficiently broad, comprehensive and practical to embrace the application of the fundamental principles as they are thus presented, and which will lead the student up to an appreciation of the various details of procedure involved in, as well as of the precautions incident to, such application.

Technic Instruction. The technic instruction in this work necessarily involves a close interweaving of the departments of operative and prosthetic dentistry, and yet the best interests of the course and of the student will doubtless be conserved by having the teaching all done by one man, or at least under the direct supervision of one particular teacher.

For the purpose of expediting and facilitating the systematic presentation of the work, however, the course should be arranged in three separate divisions: Inlay work, crown and bridge-work and plate-work.

Inlay Work. The presentation of inlay work is purposely made the first part of the course because the greater degree of simplicity which it may be made to involve affords a correspondingly increased opportunity for becoming thoroughly familiar with the fundamental details before attempting the more intricate requirements incident to the construction of more extensive work, and it in turn should then be subdivided into three sections.

Section I. The first section of this part of the course must of necessity be largely didactic and should embrace:

First—The indications and contraindications for the employment of porcelain in the filling of teeth.

Second—The principles and requirements of cavity preparation.

Third—The characteristics and comparative advantages of the metals used for matrices and the adaptation of the matrix.

Section II. Section two should embrace an adequate number of practical requirements, arranged in a more or less sequential order, to enable the student to become thoroughly familiar with the details of procedure incident to an intelligent and successful application.

For such preliminary work the technic outfit designed and supplied by Mr. Robert Brewster will be found so eminently practical and useful as to warrant its recommendation and endorsement. It includes all of the necessary appurtenances and may be most advantageously employed in the following manner:

First—The moulding of a large tooth in porcelain.

Second—The cutting of an approximal and labial cavity in same.

Third—The baking of this tooth.

Fourth—The investment of the tooth with plaster in steel cup, with labial cavity exposed.

Fifth—The adaptation of matrix by swaging directly into the cavity.

Sixth—The filling of the matrix with body and completing the inlay by consecutive bakings.

Seventh—The reinvestment of tooth in perpendicular position in cup, so as to expose approximal cavity and facilitate handling.

Eighth—Adaptation of the matrix by *burnishing.*

Ninth—The filling of the matrix by consecutive bakings.

It will be observed that these various steps are purely fundamental, and yet that they impart a knowledge of, and afford a training in, the preliminary details. While all of the work is done directly on the large porcelain tooth, an idea of the mixing and moulding of the "body," of the formation of cavities, of the fusing and shrinkage of the porcelain, of the necessity for building the filling in layers and by consecutive bakings, and of the adaptation of the matrix *by both methods,* is clearly imparted.

Section III. The third section of this part of the course is intended to be of a more advanced nature and is designed to be done under conditions more closely simulating the natural ones. For this purpose the cavities should be cut in teeth of white vulcanite, bone or some other favorable composition, as a means of imparting a training in the formation of cavities in a material which may be cut and trimmed as required, and with some facility.

Because of the advantage of adjacent teeth to indicate the necessity for separation and to guide in obtaining contour, etc., the Bryant technic models, which should have been made as a part of the preceding work in operative technics, are recommended as probably furnishing the best means available for stimulating these conditions and for admitting an observation of these requirements.

The following consecutive steps should comprise the work in this section:

1. Obtaining adequate separation.
2. Preparation of cavity, involving incisal angle, in anterior tooth.
3. Adaptation of matrix by burnishing.
4. Building, shading and baking inlay.
5. Preparation of cavity, involving approximal and occlusal surface in bicuspid or molar.
6. Taking impression of same in cement or other material.
7. Obtaining die from impression in cement or amalgam.
8. Adaptation of matrix by swaging.
9. Selection of shade or shades and building and baking of inlay.

10. Requirements of mounting and final preparation and mounting of inlays.

It will be noted that these steps are considerably more advanced than those of the preceding section, and also that they may be even further embellished so as to include a larger variety of cavities; the adaptation of either platinum or gold matrices; the use of either high or low fusing bodies, or even to also include the construction of gold inlays, at the option of the teacher and as the time allotted may permit.

Crown and Bridgework. Upon the completion of the above requirements, the work should then become still further advanced, so as to include crown and bridge-work next in order.

This part of the work should also be preceded by didactic instruction, embracing a thorough elucidation of the indications and contraindications in the more extensive application of porcelain to these purposes.

Unfortunately, platinum is the only metal that can be used in conjunction with porcelain when fused, even in technic work; hence this portion cannot well be made to include too many pieces because of the expense involved. Nevertheless, if the course is to materially benefit the student, a sufficient number of pieces to include an application of the more important principles and variations of construction must be required.

Because of the expense involved in the use of platinum, it may sometimes be thought expedient for this purpose to use a very thin gauge. This I regard as a great mistake, for two reasons: *First*, a very thin gauge may be manipulated with so great a degree of facility as not to afford to the student a knowledge of the working properties of the proper gauge for practical purposes; and, *second*, so much depends upon the metal construction of this work that an application of such economical training to practical cases might have a bad influence upon students of such tendencies, for it is well-known that a large proportion even of practitioners often use a much thinner gauge metal for the construction of all kinds of crown work than conserves to the highest degree of strength and permanency in the finished piece. For these reasons the same thickness of metal which would be indicated for practical purposes should invariably be employed.

It is to be regretted that porcelain will not attach, in fusing, to nickel, or some alloy of it, or that the same cannot be so treated by electro-plating or some other means, so as to admit of its use for these purposes, but until such time as this may be possible and the free oxidation of this metal or its alloys under extreme heat may be overcome, the use of platinum is necessary.

The general principles of construction, however, may be taught by requiring a minimum number of pieces, and such would include the construction of:

1. An anterior crown without band, or with partial band.
2. A bicuspid crown with band.
3. A bridge including two abutments and one or more dummies.

This much at least should be finally completed, and should be a positive requirement, as a means of familiarizing the student with those intricate details which differ from gold work and yet which are so essential to the successful application of porcelain work.

Such details as might be thus emphasized, even in this amount of work, would include the following essentials:

1. The requirements of root preparation.
2. The necessity for contact between surfaces to be soldered with pure gold.
3. The requirements in the relation which should exist between facing, or porcelain, and cap.
4. The necessity for securing mechanical retention between porcelain and platinum.
5. The requirements of strength in the metal construction and in the assemblage of several parts.
6. The use of platinum solder and the oxyhydrogen blow-pipe.
7. The necessity of protecting and supporting the porcelain against stress.
8. The building, packing, shading and carving of the body.
9. The influence of and necessary allowance for shrinkage.
10. Precautions incident to the heating, fusing and cooling of the work.

Any desirable variations of metal construction in addition to these may then be required and constructed in German silver, and such pieces as it might for this reason be desirable to incorporate in the course may be used to emphasize all details, excepting that of fusing the porcelain.

Platework.

Notwithstanding the lamentable fact that continuous gum dentures are not now often constructed, a course in porcelain technology would not be complete without instruction in this special line.

Because of the expense to the student, however, it would perhaps often work a hardship on him to make the construction of such plates a compulsory requirement. Yet the advantages to be derived from instruction in this phase of the application of porcelain may be obtained by requiring a technic case made on a base of German silver, with continuous gum teeth attached. This will impart all of the detail, except that of baking the body, which may then be covered didactically, and those who can afford and who may prefer to use platinum may do so at their option.

The course thus briefly outlined is presented as representing that which in my opinion should constitute the *minimum* requirements in porcelain technology; and I recommend that it be regarded as advanced work and hence should not be given until the technic courses in operative and prosthetic dentistry and orthodontia have been completed.

In conclusion, I would say that I regard this subject as a necessary and important addition to or part of the curriculum of all colleges whose faculties appreciate the possibilities of porcelain work, and the importance of thoroughly teaching it, and who recognize its permanency as an art in the practice of modern dentistry.

Discussion.

Dr. J. Q. Byram, Indianapolis. I wish to congratulate Dr. Goslee on this excellent paper. It seems quite fitting that the first paper on Porcelain Technology, before this body, should come from a Chicago teacher, and I know of no better one to present this subject than Dr. Goslee.

The two principal points to keep in mind in teaching porcelain work are, first, how can the student be taught to successfully master this art; and second, how can he be taught to appreciate work of this character so that he will not be injudicious in its application. Dr. Goslee has given an outline for the first, which if followed, will make a very thorough course of instruction.

It is reasonable to presume that certain classes of porcelain work will be indiscriminately and injudiciously employed to as great an extent as bridge-work. So every teacher should guard against this as much as possible by not appearing ultra-enthusiastic in this particular branch. While every phase of this subject should be taught, it should be done in such a manner that the student will be impressed with the necessity of being conservative in the application of porcelain.

A complete course in porcelain technology, not only gives the student a thorough knowledge of porcelain and its application, but assists in developing the artistic and esthetic qualities of his nature. Porcelain technology should be taught in the senior year, but anything tending to develop the artistic sense of the student should be given in the preceding years; carving teeth from ivory blocks, moulding and modeling in plastic materials and carving cusps to be used as patterns for constructing dies in crown and bridge work and adjuncts to porcelain technology.

I require the students of the college in which I have the honor to teach to carve six teeth from ivory blocks, model sixteen teeth in potter's clay and carve model cusps for all crowns in modeling composition or plaster of paris. This helps them to remember tooth forms so when they begin their porcelain technic they have retained some (at least one or two points) of their dental anatomy.

I agree with Dr. Goslee in that the didactic instruction should precede the technic. The course should be so graded that a technic operation will follow soon after each lecture. It is a mistake to allow the student to perform his technic operations in advance of his didactic instruction, for he never thoroughly appreciates what he is doing.

Our students are given a preliminary course similar to the one outlined by the essayist, section II first, second and third steps, which involves the moulding, the cutting of cavities, and the baking of the large tooth. The essayist says, "Upon the completion of the above requirements (referring to inlay technic) the work should become still further advanced so as to include crown and bridge work next in order." I believe the crown and bridge technic should precede the inlay because the student increases his knowledge and in manipulating porcelains, he also learns to gauge for shrinkage and obtains better results with colors, all of which will assist him in his course in inlay work, which includes the most delicate operations in porcelain technology.

If courses of instruction, both didactic and in technic, similar to that outlined by the essayist are followed, the students of today will graduate with a broader knowledge of porcelain and with greater manipulative skill than those who have preceded them. So I can only commend the outline in its entirety.

I regret that Dr. Goslee did not tell us how he teaches his students to obtain proper shades of colors, for this is the hardest part of the operation in practice. I believe the teachers of porcelain work and of physics should work together, and give the students a more thorough course on light and colors.

In conclusion I wish to thank Dr. Goslee for this excellent paper and to say that we as teachers of dental art should give the subject of porcelain a great deal of consideration and arrange our curriculum so that the students will receive full benefit of a thorough course of instruction on porcelain in all its phases.

Dr. H. C. Banzhaf, Milwaukee, Wis.

If the essayist started out with the idea of showing the value of method and system in teaching, aside from suggesting a valuable outline for the teaching of this subject, then in my opinion he has succeeded.

It seems to me that the very first question a teacher should ask himself in teaching porcelain technology is—what is the student prepared for, and second, what, of that which he is prepared for, and which he is to do in technic, does he need next.

That the teacher shall be able to answer these questions, and answer them *correctly*, is imperative, if a fundamental principle in good teaching is to be observed.

The first question relates to the importance of knowing how much didactic instruction upon this specific subject has been absorbed by the student, before technic work shall be undertaken at all. It is hard to imagine how good results *can* obtain, when this instruction does not precede, or at the very least, is carried on simultaneously with technic work.

The second question suggests the importance of aim in teaching. I take it that no one will question this truth, that without a definite purpose in the teacher's mind, there can be no definite assignment of work to be done by the student; and that without this knowing in advance what is to follow, the teacher's work must necessarily be vague and unrelated. No one, of course, will deny that a broad general purpose in the teaching of the entire subject is essential, and conceding this, it still remains true, that the specific purpose must always be to acquire knowledge and skill in a certain clearly outlined direction, in order to accomplish good results without waste of time and energy.

We, as teachers, in teaching any subject, should have our aim sufficiently definite so that it can be stated. If we cannot do that, then there is something wrong, and unless we know our "Course" we ought in all charity to bear with the student who fails in the performance.

We must continually have in mind the things which must be known or done, in order that the purpose may be realized.

The necessity for order in teaching has been forcibly brought out by Dr. Goslee. The general order as laid down by him can scarcely be criticised; but working out the detail must always remain as one of a teacher's prerogatives. Aim and order must be observed, but every teacher has the right to exercise personal freedom or even caprice in teaching. The moment a teacher permits *himself* to be reduced to an automaton, that moment he loses his individuality, and his personal influence over the student, both of which are fatal.

If a teacher knows his subject, has looked at it from every point of view, has in his preparation thought out the order in which the student is to do this work, then he is the kind of teacher who is able to cope with emergencies as they arise. We know that these conditions do arise, and here it is where the personality of the teacher becomes a vital factor, in fact means success or failure to the student. These are things which can scarcely be described, and must be "to the manner born."

They are facts based on well-established psychological principles, or if you please on common sense.

The propositions as presented to us by the essayist, speak of actual experience, and breathes the breath of life into the principle, from the known to the related unknown. This carried into practice in our laboratories and lecture rooms will usually make of the student an intelligent worker, and surely of the teacher an instructor, and educator.

Dr. J. M. Thompson, Detroit, Mich. When two or more persons agree upon a certain subject there is no room for argument. Dr. Goslee's paper is a masterpiece, and I can only emphasize a few of the points mentioned by him.

Too much cannot be said in favor of teaching the student the names and the relative merits of the materials which are used in the manufacture of porcelain. It does not follow necessarily that the manufacture of different bodies must be taught, but a knowledge of what each ingredient may be expected to produce will lead to a more intelligent selection of materials offered for sale by the different manufacturers.

It matters very little whether inlay or crown and bridge work are taught first. The same general principles govern the manipulation of the porcelain in either line, and as far as the colors are concerned their selection rests entirely with the student. Porcelain may correctly be termed "the spotless one" in dentistry, therefore it calls for the most thoughtful and careful teaching.

Dr. A. E. Webster, Toronto, Can. I never before heard such a good discussion of the subject of teaching, nor better principles than those enunciated by Dr. Goslee. I have here a model that may be used nicely for porcelain inlay work and for crowns. The student can select the shade and shape of the teeth. The teeth are made of vegetable ivory. Dr. Black suggested that we make the rubber harder than we have so that the teeth will stand in position more rigidly. This model is more rigid than we have been making them. The vegetable ivory is easily cut and yet it is quite friable. It cuts much like dentine.

It might be well, for porcelain technic purposes, to experiment with a cheaper material like iron. If bath tubs and porcelain signs can be made on iron, we ought to be able to make porcelain technics for college purposes in the same way.

Dr. J. A. Sherwood, Buffalo, N. Y. This is an excellent paper. It is well arranged, concise and does not wander from the subject. My first instruction in porcelain technology I obtained from Dr. Goslee, and since then I have endeavored to follow him, working out from my own experience what I could. I would like to ask Dr. Goslee how much of this work, if any of it, should be taught in the freshman year. The work outlined covers such a comprehensive scope that I do not see how all of it can be taught in the course we have now. When we come to the four year course then I can see how the work can be taught to the different classes. Personally, I am not in favor of teaching the work in the freshman year, although I think Mr. Brewster's object in getting up this outfit was that it should be used by the freshmen, but if it is to be taken into the technic course of the junior year, I do not see how we can get the time for teaching all that was outlined in the paper.

I have had some trouble in teaching crown and bridge work to find time in which to do it all, to say nothing of the technic work that belongs to porcelain. I have had to teach the technic work of that in the senior year, which I think is wrong. I have found that after getting in all the work that belongs to ordinary crown and bridge work I have no time left for teaching the technical or practical work in porcelain. There are a few students who will find time to reach that stage because of their ambition and hard work, but they are few in number. As the matter stands today our students graduate with only a limited knowledge of porcelain work. It is not right and something should be done to remedy this evil.

Dr. W. C. Reeves, Chicago. This is the most complete outline of a course in porcelain work ever presented, and it certainly will bring good results. If we cannot agree on the importance of porcelain work, we ought at least to express our opinions on the subject and not be afraid of it. It has come to stay and occupies a more prominent position every year, and speaking of it as "where indicated" should cease. None of you talk about where gold is indicated. It has become a fixed feature in operative dentistry. Consequently it is taught, I might say, indiscriminately. I believe that if porcelain is put on an equal footing with gold as a filling material, it will reap greater benefits for the laity than the employment of gold ever did.

There are a few things in the paper with which I differ. I believe that the student will grasp the technique of crown and bridge work in porcelain more easily than he will inlay work. By that I mean that he will master the principles of fusing and baking porcelain more easily, and should be well grounded in this. He may get a fill of didactic work in this subject, but he will get his serviceable knowledge only from practical work and observation. He will get it in the baking of porcelain crowns. He gets a better idea of crown and bridge work in a general way than he does of porcelain inlay work.

I do not see that much benefit could be derived from teaching about the different ingredients of porcelain. Why not teach him the same thing about amalgam, or the different methods of producing the various kinds of gold? That feature of the work belongs to the manufacturer. But the student should be taught all about the different kinds of bodies; the results of baking the different bodies; their composition, form and process of manufacture. He should be well versed in the baking of four or five of the bodies before us at the present time.

I think that all of this part of the work should be taught in the junior year, previous to his going to the chair to do any operating. Then he is ready to receive the more advanced instruction in technic and in actual practical work, handling cases, etc.

Dr. Hall,
Ann Arbor, Mich.

I would like to ask Dr. Goslee how much time should be devoted to the teaching of porcelain. I am sure we are all impressed with the paper and I am convinced that a copy of it would assist us greatly in the formation of our curriculum of the four-year course.

Dr. R. H. Hofheinz,
Rochester, N. Y.

This is the best paper I ever listened to with regard to the teaching of porcelain work; but what I want to know particularly is this: How would he discriminate, or to whom would he relegate the teaching of porcelain work; the technique and history of it. To the professor of operative dentistry or to the professor of prosthetic dentistry? We discriminate between porcelain inlays and porcelain work on crowns and bridges.

There is one point in the paper with which I do not quite agree, and that is, that it should be taught after orthodontia. I think orthodontia comprises a great deal more than porcelain work; the latter appeals particularly to the technic manual or esthetic side. Orthodontia appeals not only to this but also to the scientific side.

Dr. Goslee.

As to which chair shall instruct in the didactic portion of this course, you will remember that the presentation of the course, as outlined, necessitates a close interweaving of operative and prosthetic dentistry. I suggested that the technic instruction might come either from the chair, or from a demonstrator. The didactic work as applied to operative dentistry should come from the professor of operative dentistry; and that portion which pertains to prosthetic dentistry should come from that chair. These two chairs should then have one instructor to give the technic instruction during the entire course. This is the manner in which the course in our school is conducted. Dr. Johnson delivers all of the lectures pertaining to the indications for porcelain fillings, cavity preparation, etc., and I take care of that portion which covers history, composition, manipulation, crown, bridge and plate work, yet we have but one demonstrator who does all of the technic work.

I said in my paper that I believed that this course should follow the technic courses in operative dentistry, prosthetic dentistry and orthodontia. It is not necessary, however, that it should follow orthodontia, but it should follow the operative and prosthetic courses.

Dr. Thompson. The necessity of having this course follow orthodontia is evident, because if the student has been taught thoroughly in the movements of the teeth and separation first, it will help him greatly in inlay work.

Dr. Hofheinz. The separation of teeth comes under the domain of operative dentistry.

Dr. Sherwood. Dr. Reeves suggested something that has occasioned me considerable trouble. I would like Dr. Goslee to tell us how he manages to teach students the fusing of porcelain. We cannot allow students to handle furnaces indiscriminately, and yet there is no way to acquire that knowledge except by personal experience with the furnace.

Dr. J. E. Nyman, Chicago. In my limited experience as a teacher of porcelain prosthesis I have more trouble teaching the student how to properly manipulate and fuse porcelain body than to do any other part of the work. The training incidental to the construction of gold crowns and bridge work and gold plates is of material assistance to them in the construction of the platinum framework which is the foundation of porcelain crown and bridge work. I have very little difficulty in instructing students to do this part of the work, but in teaching the manipulation of the porcelain body I have a great deal of trouble. It is a substance the manipulation of which is entirely different from the manipulation which obtains in the handling of gold, plaster or amalgam, or any other material, and therefore I would recommend that the courses be so arranged that more work be done in the technique of the manipulation of the porcelain bodies.

In regard to instructing students how to fuse porcelain: I divide my classes into small sections and tell them what my experience has been in the handling of various porcelain bodies; what temperature is necessary for the fusing; and I also tell them how to handle the various makes of furnaces. I impress upon them, however, that all furnaces vary and that therefore there is a variation in the general instructions I give them. That the same thing is true of the porcelain bodies, that even the same make of body will not always fuse at the same temperature. I teach these sections how to handle the furnace and my instructions always take the side of caution so that they will take more time to fuse the porcelain than is really necessary or than they will allow later on when they have had more practice.

I wish to commend the whole paper very heartily. The subject has been presented in a scientific manner by a man who not only has acquired dexterity himself, but who also has succeeded in imparting this dexterity to others.

Dr. Goslee. Allow me to preface my closing remarks by thanking the society for the manner in which it has received my paper. I also desire to thank those who have discussed it for the kind words said. I should have preferred, however, to have it criticized because it is by criticism that we learn.

In the preparation of this paper—at the suggestion of the chairman of the executive committee—I hardly knew where to begin and where to end, because so far as I know, there has never before been presented anything of similar nature. I had nothing to go by, except my practical experience, and hence, the paper is based entirely upon it.

In his discussion Dr. Byram said that crown and bridge work should precede inlay work in the technic course. Dr. Reeves and Dr. Sherwood were, I believe, also of the same opinion. That is, after all, only a matter of opinion, and I do not know that it is very important in any event. It is my own opinion, however, that inlay work should always precede crown and bridge work because it is more simple in its application. You can learn to manipulate and control a small amount of material quicker than you can a large amount, and you can learn to make the matrix for a cavity quicker than you can learn the requirements of metal construction for crown and bridge work.

We should begin at the bottom, thus taking up inlay work first because of its simplicity, but if you can do better by teaching first crown and bridge work, you ought to begin that way, and yet I believe that my students have profited by beginning with inlay work.

Dr. Byram also said something with reference to teaching students how to obtain the proper colors. You will agree with me in that the color proposition in porcelain work is the hardest thing in connection therewith, and I am sure that Dr. Reeves has found it more difficult of mastery than any other problem in connection with this work. There are, doubtless, some students who never can learn to match colors. An eye for color is required, and such an eye is something that not everyone possesses. I believe that we can impart instruction in this by requiring students to put fillings in porcelain teeth in the technic course. For this purpose I have added to this arrangement of the subject the filling of two cavities in porcelain teeth, and as the colors must be matched as closely as possible, it may necessitate the making of several inlays before the desired color is obtained, but this work can, perhaps, best be taught out of the mouth and not in the mouth.

Fusing Porcelain.

Next to the problem of color is the problem of fusing. This is one of the most difficult things to teach, but I have not experienced the difficulty mentioned by Dr. Nyman, probably because I go at it differently. He says that all furnaces vary; and that the sources of heat production also vary, which we all know to be true. Hence, it is practically impossible to teach the fusing of porcelain by any *test*. If the sources of heat production, and all of the "bodies" vary, as Dr. Nyman said—and I believe the latter is also true—then it is almost impossible to have any accurate test for the fusing of porcelain.

I am very much interested in this matter because I have pursued different lines in teaching, as well as in practice. I believe that if you will follow this course you can teach anybody to fuse correctly: First of all, learn to do it yourself and then you can teach others, and fuse it by the eye. How do they melt steel? Not by tests. The color of the heat is what they go by. Take the flat surface of a central incisor facing, for instance, and build up a little mound of porcelain on it. Put this into the furnace and watch the fusing until the porcelain has assumed the color of the facing. Porcelain "body," as soon as it is dry, is white, and all you have to do is to watch it more or less closely until the white mass begins to change color, which represents the beginning of vitrification. Then watch it more closely until it is as smooth as the porcelain facing on which it rests. Anyone can learn this, and Dr. Seamons, who is present, will bear me out I think, because it is only recently that I have been able to teach him to fuse porcelain in this way. By beginning with the gold test students may possibly learn quicker because they will not have to observe anything up to the point of the fusion of the gold. Fusing porcelain is altogether a matter of experience, and such knowledge cannot be acquired in the first few days of the course. Watching a furnace heated to such an intense degree of heat, as is required to fuse porcelain, is claimed to be injurious to the eyes, but I have been doing it for years, and have never worn glasses, nor have I had any trouble with my eyes. It is not necessary to get close to the furnace and you need not hesitate to open the door at any time, because the volume of heat is so great that the immediate ingress of cold air is impossible.

Technic Models. I referred to the models as being Dr. Bryant's models only because Dr. Bryant manufactures them. Everyone familiar with the transactions of this institute knows that Dr. Webster originally presented the idea before this body in 1899, and I am not giving Dr. Bryant credit for anything except the manufacture of the teeth and models, and for placing them within our reach.

I am very much pleased with Dr. Webster's new model. I know that he has been working on vegetable ivory for some time and hope he has at last found something which will be an improvement on vulcanite teeth, but I have not yet been able to find anything superior to the teeth supplied by Dr. Bryant.

Dr. Webster also suggested that iron might be used in the technic work for porcelain. Iron is less readily oxidized than nickel, but I believe it is equally impossible to fuse the high grade porcelain "bodies" on iron. Nor do I believe that it would be practicable to apply iron to the construction of crown and bridge work. I have not yet found any metal that can be used with the high grades of porcelain, although low grades can be fused on the surface of nickel or iron because their fusing point is not high enough to oxidize the surface of these metals.

As to when this porcelain course should be given: That will depend largely on the teacher and the school. I do not see how I could place it anywhere else than in the junior year, because we want it to follow the technic courses in operative and prosthetic dentistry. It should be given before the senior year and before students have to apply these principles in the mouth, so that I do not see where else in a three-year course it could be given, except in the junior year.

Dr. Reeves said that he did not see the necessity of teaching the composition of porcelain compounds. I do not believe that we could teach the difference between the high and low fusing bodies without teaching their composition. We know that every compound on the market has a proprietary formula, but we do not need to find that out, and should only aim to impart a general knowledge of the composition of the various porcelain compounds, so that students may know the difference between high and low fusing bodies.

Minutes.

The tenth annual meeting of the Institute of Dental Pedagogics convened on December 28th, 29th, and 30th, 1903, at the Iroquois Hotel, Buffalo, N. Y.

December 28th, Morning Session.

Dr. J. D. Patterson, president, called the meeting to order at 11 o'clock Monday morning, December 28th.

On motion of Dr. G. E. Hunt the minutes of the previous meeting, as published in the proceedings, were adopted.

The Executive Board, through the chairman, Dr. W. H. Whitslar, presented the following report which was adopted on motion.

Report of Executive Committee.

The Executive Committee have the honor to present for your consideration the programme of the present meeting.

Beset with the usual difficulties of arranging a programme we were grieved by the death of two members, who had promised papers upon subjects dear to their hearts. Probably no one was more qualified to present certain phases of the dental curriculum than Professor William C. Barrett. It had been his intention to discuss the unification of the curriculi of the colleges of the world. The presentation of facts known to Professor Barrett would have contributed to progressive dental teaching the world over.

By the death of Professor Jonathan Taft, that pioneer of dentistry, we lose the advantage of his knowledge of the historical conditions of the development of the science of dentistry in America, which he could speak of authoritatively.

After the shock caused by these deaths the committee were fortunate in securing two members to prepare papers on short notice. We are under obligations to Doctors George E. Hunt and H. L. Ambler for this courtesy.

The committee have been fortunate in presenting diversified subjects which attract to our meeting those who have not been identified with our institute. We have made an effort to persuade at least twenty schools to become members of the Institute that have not held membership heretofore, and upon this occasion heartily extend an invitation to them to join this organization. All colleges in proper affiliation with the National Association of Dental Faculties are entitled to membership.

The local committee has given the Institute every assistance in preparation of this meeting.

This report would be incomplete if it did not express thanks for the beautifully printed programmes now in your hands which have been donated by the Buffalo Dental Manufacturing Company.

All sessions will be held in this room except the evening session today, which will be held at the dental college. The special order will be papers of Drs. Guilford and Case. Respectfully submitted,

W. H. Whitslar, *Chairman.*

The Executive Board recommended the following colleges for membeship: New York Dental School, Colorado College of Dental Surgery, and University of Southern California, College of Dentistry.

Recommendation adopted on motion.

The secretary-treasurer presented his report as follows, which was referred to the Executive Board:

Cash on hand, Dec. 29, 1902	$305.81
Dues for 1903, and back dues	350.00
Bank Interest	6.25
	$662.06
Expenditures as per Ledger	276.79
Cash on hand, Dec. 28, 1903	$385.27

Membership reported, Dec. 29, 1902	35
Colleges admitted to membership at last meeting	1
Colleges defunct	1
Colleges in arrears for two years fees and dropped from membership	2
Present membership, Dec. 28, 1903	33

Immediately after last meeting the report of the committee on curriculum was printed and about 450 copies distributed to all colleges which were members of the National Association of Dental Faculties. Several appreciative notes were received from colleges not members of this body, expressing their thanks. Respectfully submitted,

W. E. Willmott, *Sec'y-Treasurer.*

Dr. G. B. Snow, Buffalo, delivered the following address of welcome to the Institute:

Address of Welcome.

Dr. G. B. Snow. Mr. President, Ladies and Gentlemen: It affords me great pleasure to welcome you on this, your first visit to our beautiful city of Buffalo, as members of the Institute of Dental Pedagogics. I suppose most of those present have been here before, but possibly there are some who have not, and for their benefit I will say that Buffalo is a most beautiful place, especially in the summer. We have near us a lake which carries the commerce of a nation. We also have a dental college of which I am not ashamed. At the Niagara Falls we have the greatest source of power in the world, and there is nothing more strange to me than the way in which this power is developed from this great rushing mass of water, by causing it to turn immense dynomos, mere inert masses of metal until they receive a mighty impulse which they transmute and develop into that subtle force which we call electricity; about which we really know so little. This electricity is conveyed to our city, and turns the wheels of our factories. It furnishes us our light, and when we ride in our street cars, you are drawn by the mighty force of the Niagara river.

In welcoming you, I have only to say that the city is yours. You can do what you will while here, and I hope that when you leave, through contact of mind with mind you may be ennobled and carry home with you new ideas and be able hereafter to do better work. Again I congratulate you, and bid you a most hearty welcome.

Dr. Edward C. Kirk, Philadelphia, responded to the address of welcome as follows:

Dr. Kirk. Mr. President, Professor Snow, and Gentlemen of the Institute: I could have wished you to select some more competent spokesman to voice the sentiment of approval which we all feel in hearing these words of welcome from our hospitable host Dr. Snow. Some years ago I was told by a gentleman, who had a good deal to do with New England audiences, that he found that he did not receive that visible response to his oratory to which he felt entitled, but in analyzing that peculiar frigidity, in New England towns, he said it was one of New England's faults that the natives were not able to express in words the kindly sentiments which they felt in their hearts. So on this occasion I feel as though I were a native of New England, and am not able to express the sentiments of appreciation at the cordial welcome given us by Dr. Snow. I am sure that you will all agree when I say that we have been welcomed by Snow both inside and out, but this is not to be taken as the measure of the warmth of our reception. So, in behalf of the members of the Institute, I desire to express our extreme appreciation of what he has said and thank him very much for it.

The vice-president, Dr. H. B. Tileston, was called to the chair while the president presented his annual address.

The discussion was participated in by Dr. J. I. Hart (read by Dr. Sanger), Drs. Platt, G. E. Hunt, Guilford, Reeves, Kirk, Cigrand, Hofheinz and Patterson.

The Executive Board recommended that the courtesy of the floor be extended to two visitors from Norway, Drs. Johan Brun and Lorenz Selmer, and to all others connected with Dental Colleges.

Recommendation adopted on motion.

The Executive Board recommended Howard University of Washington, D. C., for membership.

Recommendation adopted on motion.

Adjourned at 12:45 till 2 p. m.

Afternoon Session.

The association was called to order by the president at 2:45 p. m. Minutes of the previous session read and approved.

Dr. G. E. Hunt presented his paper on "The Dental Curriculum."

Discussion was opened by Drs. G. V. Black and J. B. Willmott, and continued by Drs. Long, Friedricks, Platt, Hofheinz, Litch, Gallie, F. B. Noyes, Guilford, Tileston, Shattuck, Bebb, Bethel. Dr. Hunt closed the discussion.

Papers on "How Shall Quizzes be Conducted," were presented by Dr. R. H. Nones, Dr. F. D. Weisse (read by Dr. Starr), and Dr. L. P. Bethel. These were discussed by Drs. Berry, J. B. Willmott, Hoff, Platt, Long, Wilson and Starr.

Adjourned at 6 o'clock.

Evening Session.

Meeting in the lecture room of the Dental College at 8:15 with the president in the chair. Minutes of previous session read and approved. Drs. C. S. Case and S. H. Guilford presented papers on "Orthodontia Technology." Discussion opened by Drs. Webster and Pullen and continued by Drs. Hofheinz, Littig, Hoff, Hillyer, and closed by Drs. Case and Guilford.

Adjourned at 10:45 p. m. till 10 a. m.

December 29th, Morning Session.

Session opened at the college at 10:30, president in the chair. Minutes of previous session read and approved. President appointed Drs. Brophy, J. B. Willmott and Littig a committee on necrology. Executive Board reported as a special order of business for 4 o'clock, a visit to the Buffalo Dental Manufacturing Company's factory. Drs. Cigrand and A. O. Hunt presented papers on "Methods of Teaching the Anatomical Arrangement of Teeth." Discussion opened by Dr. Berry. Adjourned at 12:45 to accept the kind invitation of the authorities of the Dental College to luncheon.

Afternoon Session.

The president called the meeting to order at 2:15 p. m. in the Iroquois Hotel. Discussion of the papers presented at the morning session was continued by Drs. Hoff, Wilson and Bebb and closed by Dr. Cigrand.

Dr. Butler, on behalf of the profession in Buffalo, invited the members to a complimentary banquet to be held in the Iroquois Hotel on Tuesday evening. He also urged the Institute to make a grant towards the funds of the Fourth International Congress at St. Louis.

The president called Dr. Nones to the chair, and presented the following motion, seconded by Dr. Zapffe: "That this meeting authorize the Executive Board to appropriate the sum of $200 to the Congress."

Motion carried.

Dr. D. R. Stubblefield presented his paper on "An Ideal in Pathology." Discussion was opened by Dr. Hertig and continued by Drs. G. E. Hunt, Black and Hartzell, and closed by Dr. Stubblefield.

The Executive Board recommended Tuft's Dental College for membership. Recommendation adopted on motion.

Adjourned at 4 o'clock to accept the invitation of the Buffalo Dental Manufacturing Company to visit their works.

December 30th, Morning Session.

The vice-president called the meeting to order at 10 a. m. Minutes of the previous sessions read and approved.

Paper by Dr. J. D. Moody on "Ethics, Literature and Hygiene—Our New Chair," was read by the secretary. Paper on "The Value of Instruction in Dental History and Literature," was read by Dr. H. L. Ambler. These papers were discussed by Drs. McManus, Cigrand, Kennerley, Thorpe, Black, Hofheinz, Bebb, J. B. Willmott, and closed by Dr. Ambler.

The Committee on Necrology presented the following report which on motion was adopted and ordered to be entered on the minutes:

Report of the Committee on the Death of Dr. W. C. Barrett.

Whereas, This Institute, with deep regret, has learned of the death of Dr. Wm. C. Barrett, a representative in this Institute, from the Dental Department of the University of Buffalo; and

Whereas, In the death of Dr. Barrett this Institution has lost one of its most earnest and devoted members; therefore be it

Resolved, That the Institute of Dental Pedagogics, hereby places on permanent record, the high esteem in which its members hold the memory of the late Dr. Barrett. Especially we emphasize our appreciation of the enthusiasm and marked ability with which he discharged the arduous duties devolving upon him as editor and teacher, the high ideals which he presented, and which he enforced by his personal example; the regularity of his attendance at the local and national meetings of organized dentistry, and the influential part which he took in the proceedings and discussions; and the notable, persistent, and effective effort which he made to redeem the good name of American Dental Association in continental Europe.

Resolved, That a copy of this resolution be forwarded to his widow with an expression of our sympathy with her in her great bereavement.

T. W. Brophy,
J. B. Willmott,
J. Bond Littig, Committee.

Report of the Committee on the Death of Dr. Jonathan Taft.

Whereas, This Institute has learned with deep regret of the death of Dr. Jonathan Taft, a representative in this Institute from the Dental Department of the University of Michigan; and

Whereas, In the death of Dr. Taft the Institute has lost one of its most earnest and respected members; Therefore be it

Resolved, That the Institute of Dental Pedagogies, hereby places on permanent record the high esteem in which its members hold the memory of the late Dr. Taft. Especially we emphasize our appreciation of the valuable pioneer work in our profession, done by him commencing more than sixty years ago, and of which we are still reaping the harvest; of the valuable service which he has rendered as teacher, editor and author; of the uniform good influence which his constant attendance upon, and active participation in the local and national gatherings of organized dentistry; of the quiet, but widely permeating influence of a long consistent Christian life.

Resolved, That a copy of this resolution be forwarded to his widow with an expression of our sympathy with her in her great bereavement.

T. W. Brophy,
J. B. Willmott,
J. Bond Littig, Committee.

Dr. H. J. Goslee presented a paper on "Porcelain Technology" which was discussed by Drs. Byram, Banzhaf, Thompson, Webster, Sherwood, Reeves, Hall, Hofheinz, Goslee and Nyman. Closed by Dr. Goslee.

Dr. W. G. Foster presented the report of the committee on new appliances, charts and books, and Dr. Hillyer the report of the Master of Exhibits. On motion these reports were adopted and ordered to be entered on the minutes.

Report of Committee on New Appliances, Etc.

Your Committee on New Appliances, Charts and Books, after a careful inspection and consideration of all such as have been presented to this meeting, beg to submit the following report. Your committee has investigated and considered the appliances brought before them in the endeavor that all should receive their due credit. We were instructed to bring to the notice of this body "those things of unusual merit." There are many appliances among the display that, had your committee more time to investigate them, would no doubt have been brought before you. We would suggest that hereafter the Committee on New Appliances, etc., request exhibitors (who desire their appliances specially mentioned before the Institute of Dental Pedagogics) to send this committee type written discriptions of their exhibits in order that the committee may more intelligently study them. Your committee would also suggest that the Committee on New Appliances, Charts, etc., be appointed for a term of two years, or that one member be continued upon it. In this way there would be no break, and the committee would always have the advantage of one member who has served one year and who would be familiar with the committee's work.

Books. A number of books were presented, but we have selected only those that were issued since our last meeting. Dictionary of Medical Science, by R. Dunglisson, 23d edition. Manual of Surgical Treatment, F. F. Burghard, Vol. 6. Text Book of Anatomy by American Authors, F. H. Gerrish, M. D. Text Book of Surgical Principles and Surgical Diseases of the

Face, Mouth and Jaws, by H. H. Grant, A.M., M.D. American Illustrated Medical Dictionary, by W. A. Dorland, A. M., M. D. Dental Materia Medica Therapeutics and Prescription Writing, by E. H. Long, M.D. Manual of Practical Anatomy, by E. J. Cunningham. Success in Dental Practice, by C. N. Johnson, M.A., L.D.S., D.D.S. Essentials of Anatomy, Questions and Answers, by C. B. Nancrede, M.D. American Pocket and Medical Dictionary, by W. A. N. Dorland, A.M., M.D.

Appliances and Charts.

New York College of Dentistry.

A set of thirteen new charts illustrating a syllabus of a course in crown and bridge work. A simplified system of practice soldering showing the blank with backings so arranged as to admit of the investing and soldering.

Pittsburg Dental College.

Dr. Arthur has submitted the Typodont as a model for operative technics and for porcelain technics in making of matrices.

Royal College of Dental Surgeons.

Dr. A. E. Webster presents a systematic method of keeping records of orthodontia done in clinic room. He also presents a table of the chief characteristics of the various bacteria found in the mouth.

Philadelphia Dental College.

Dr. S. H. Guilford presents a large plaster model, with detachable plaster teeth. The socket for each tooth is enlarged at the alveolar border so as to permit of the free movement of the tooth in various directions. Each tooth has inserted in its base an aluminum wire to keep it in position, but which will bend as the tooth is moved. The space between each tooth and its socket is filled with modeling clay, to allow the tooth to yield readily under pressure. This permits each individual tooth to be placed in any desired position of irregularity. Enlarged regulating appliances can be attached to the teeth and operated before the class as they would be in the mouth. Several appliances of this character were shown in connection with the model.

Dr. C. F. Bryant presents his flexible tooth forms for the technic teaching in all forms of dentistry.

Dr. Emory A. Bryant, of Washington, presents his method for the repairing of porcelain facings and bridgework.

University of So. California, Dental Dept.

The Dental Department of University of Southern California presents specimens of comparative dental anatomy.

The first step in the process is to remove the organic matter; this is done by boiling or maceration, the latter method preferable, and is accomplished by keeping the specimens in a stone receptacle filled with water until the flesh has softened so that it can be washed away. Thoroughly dry and remove grease from the specimens by immersion or three days in a gasoline bath. Again thoroughly dry and bleach in commercial peroxide of hydrogen.

W. G. Foster, *Chairman,*
L. S. Tenny.

Report of Master of Exhibits.

Pittsburg Dental College, specimens of student's work upon typodont showing operative methods; also porcelain technic.

University of Michigan, Dental Dept.: Operative and prosthetic methods; views of buildings.

Philadelphia Dental College: Class-room and teaching methods of orthodontia and crown and bridge work.

Vanderbilt University, Dental Dept. Drawings by students showing nine hours' operative technic work.

University of Southern California, Dental Dept.: Specimens used in teaching comparative anatomy.

University of Buffalo, Dental Dept.: Operative, prosthetic and bacteriological exhibits.

Kansas City Dental College: Charts with paper tooth-forms drawn, cut out and mounted by students.

Ohio College of Dental Surgery: Operative technic of first year and second year, prosthetic technic of first, second and third year.

Royal College of Dental Surgery: Students' exhibit in orthodontia.

New York College of Dental Surgery: X-Ray instruction with pictures illustrating same. Physical laboratory charts, student work in anatomical tracings, prosthetic work and charts.

Nineteen late publications were exhibited by Lea Bros. & Co., W. B. Saunders & Co., and J. B. Lippincott Co.

Dr. C. F. Bryant, rubber models, carrying tooth forms for teaching technic work.

Dr. E. A. Bryant, of Washington, D. C., method of repairing bridge work.

The exhibits this year are less in number and, in most instances, less in size than at previous meetings. This can be accounted for in but one way—the fear of repetition of exhibits. As was indicated in the preliminary notices sent out by your master of exhibits, this is a decided mistake. New methods and specimens of class work are more than welcome, but there are always present some instructors who have never attended a session of the Institute, and to whom all exhibits are valuable. I would bespeak for my successor in office for the coming year a better response to the call which will be made for exhibits. If new material is not at hand, bring something in order that a full representative exhibit from each college may appear.

Respectfully submitted,

ELLISON HILLYER, D.D.S.

Executive Board reported that the treasurer's book had been audited and found correct.

Moved by J. B. Willmott, seconded by Dr. W. H. Whitslar:

"That the Secretary be directed to convey in suitable terms, to the Dental Department of the University of Buffalo, the Buffalo Dental Manufacturing Co., the Dental Profession in Buffalo, and the Committee on Local Arrangements, our appreciation of the coutesies extended by them to the members of the Institute." Carried unanimously.

The secretary was instructed to thank the management of the hotel, on behalf of the members, for the manner in which the Institute has been treated during the meeting.

On motion of Drs. Hall and Bethel, the Publication Committee was asked to have Dr. Goslee's paper published as early as possible.

Dr. Brun, of Norway, expressed his pleasure at being at the meeting and his appreciation of the courtesies extended to him. A letter was received from Drs. Morgan, Cattell and Dale, expressing their regrets at being unavoidably absent from the meeting.

The next order of business was the election of officers for the ensuing year. In each case the rules were suspended on motion and the secretary directed to cast a ballot for:

President, Dr. H. B. Tileston, Louisville, Ky.

Vice-president, Dr. W. H. Whitslar, Cleveland, Ohio.

Secretary-Treasurer, Dr. W. E. Willmott, Toronto Canada.

Member of Executive Board (three-year term), Dr. L. P. Bethel, Columbus, Ohio.

Invitations were extended to the Institute to hold its next meeting at San Francisco, Los Angeles, New Orleans, Milwaukee and Louisville.

Dr. Goslee introduced the newly elected officers who were duly installed and expressed their appreciation of the honor conferred on them.

The minutes of this session were read and approved and the institute adjourned *sine die* at 1:30 p. m.

W. EARL WILLMOTT, Secy.

The Executive Board accepted the invitation from Louisville and the meeting of 1904 will be held in that city Dec. 28, 29, and 30.

Appendix—A.

List of membership colleges with duly accredited representatives present, dues paid and entitled to vote:

Northwestern University, Dental Department; Dental Department, Vanderbilt University; Louisville College of Dentistry; Royal College of Dental Surgeons; Dental Department, Western Reserve University; Chicago College of Dental Surgery; University of Michigan, College of Dental Surgery: Ohio College of Dental Surgery; University of Iowa College of Dentistry; Indiana Dental College; Kansas City Dental College; University of Buffalo, Dental Department; Dental Department, University of Pennsylvania; Philadelphia Dental College; Department of Dentistry, Detroit College of Medicine; Dental College, Ohio Medical University; Missouri Dental College; Dental Department, University of Omaha; Pittsburg Dental College; New York College of Dentistry; College of Dentistry, University of Illinois; Medico-Chirurgical College, Dental Department; New Orleans College of Dentistry; Cincinnati College of Dental Surgery; Baltimore College of Dental Surgery; Marion Sims Dental College; Milwaukee Medical College, Dental Department; Pennsylvania College of Dental Surgery; New York Dental School; University of California, College of Dentistry; Howard University; Colorado College of Dental Surgery; Tufts College, Dental School; University of California Dental Department.

Membership colleges without accredited delegates:

Southern Dental College; College of Dentistry, University of Minnesota; Keokuk Dental College; Birmingham Dental College.

Colleges represented by delegates, 34; colleges not represented, 4; colleges admitted at this meeting, 5; colleges dropped for nonpayment of dues, 2; colleges defunct, 1; present membership, 38.

Respectfully submitted,
W. Earl Willmott, Secretary and Treasurer.

Appendix—B.

Those in attendance: G. B. Snow, E. H. Long, J. W. Beach, J. L. M. Waugh, D. H. McCoy, H. B. Huver, J. A. Sherwood, C. E. Wettlaufer, J. R. B. Hicks, A. N. Wilbur, R. H. Hofheinz, E. H. Kelsey, A. F. Isham, T. A. Hicks, J. M. Tench, Buffalo, N. Y.; G. S. Shattuck, C. C. Noble, G.

S. Hall, M. T. Watson, Detroit, Mich.; L. P. Bethel, H. V. Cottrell, H. M. Semans, C. A. Hawley, Columbus, Ohio; W. H. Whitslar, H. L. Ambler, G. H. Wilson, D. H. Ziegler, Cleveland, Ohio; L. P. Hall, N. S. Hoff, Ann Arbor, Mich.; G. V. I. Brown, F. H. Berry, J. C. Nyman, Milwaukee, Wis.; G. E. Hunt, Indianapolis, Ind.; J. D. Patterson, Kansas City, Mo.; H. J. Goslee, C. S. Case, T. W. Brophy, C. F. Bryant, W. T. Reeves, G. V. Black, F. B. Noyes, B. J. Cigrand, D. M. Gallie, F. C. Zapffe, Chicago, Ill.; M. C. Marshall, W. F. Lawrenz, J. H. Kennerley, St. Louis, Mo.; F. L. Platt, San Francisco, Cal.; W. Bebb, Los Angeles, Cal.; W. G. Foster, Baltimore, Md.; A. O. Hunt, W. H. Sherraden, H. T. King, F. R. Ross, J. J. McMullen, A. W. Nason, Omaha, Neb.; H. W. Arthur, H. E. Friesell, O. L. Hertig, W. H. Fundenberg, Pittsburg, Pa.; D. R. Stubblefield, Nashville, Tenn.; H. B. Tileston, W. E. Grant, N. T. Jager, Louisville, Ky.; J. B. Willmott, W. E. Willmott, H. Clark, A. E. Webster, W. C. Trotter, E. C. Abbott, H. R. Abbott, Toronto, Ont.; S. H. Guilford, E. C. Kirk, C. R. Turner, Robert H. Nones, W. F. Litch, Philadelphia, Pa.; A. G. Friedrichs, New Orleans, La.; D. E. Sheehan, H. T. Smith, Cincinnati, Ohio; J. Bond Littig, A. R. Starr, Ellison Hillyer, C. M. Ford, W. S. Russell, R. M. Sanger, New York, N. Y.; A. J. Brown, Washington, D. C.; W. I. Chambers, Denver, Colo.; E. W. Branigan, Boston, Mass.

Visitors: C. L. Babcock, Milwaukee, Wis.; F. W. Stiff, Richmond, Va.; B. L. Thorpe, St. Louis, Mo.; Johan Brun, Lorenz Selmer, Christiania, Norway.

Dr. C. M. Ford

The Institute of Dental Pedagogics

Serial
A
12
1904

12th Annual Meeting

Held at LOUISVILLE, Kentucky
December 28, 29 and 30, 1904

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Twelfth Annual Meeting

OF THE

Institute of Dental Pedagogics

MINUTES.

The twelfth annual meeting of the Institute of Dental Pedagogics was held on December 28th, 29th and 30th, 1904, at the Galt House, Louisville, Ky.

WEDNESDAY MORNING SESSION.

Dr. H. B. Tileston, president, called the meeting to order at 10.45 Wednesday morning, December the 28th. The president introduced Judge Alexander P. Humphrey, who welcomed the Institute to Louisville. This was replied to by Dr. J. D. Patterson. (Page 15.)

On motion of the secretary the minutes of the last meeting were adopted as published in the proceedings, changing the word "tenth" in the first line to "eleventh."

Dr. Stubblefield, chairman of the Executive Board, presented a verbal report, which was received on motion.

The secretary-treasurer presented his report as follows, which was referred to the Executive Board:

Cash on hand, Dec. 28, 1903	$385 27
Dues for 1904	350 00
Bank interest	10 05
	$745 32
Expenditure as per ledger	$494 57
Cash on hand, Dec. 28, 1904	$250 75

Membership reported, Dec. 28, 1903	33
Colleges admitted to membership at last meeting	5
Present membership, Dec. 28, 1904	38

The Institute is under obligation to Dr. Ottolengui, and the "Items of Interest," for publishing the proceedings of the 1903 meeting. A copy was mailed to each person who was present at that meeting, or that of 1902.

W. E. Willmott, *Sec'y-Treasurer.*

The president called J. H. Kennerley to occupy the chair, while he presented his annual address. (Page 17.)

Discussion was opened by J. B. Willmott (read by secretary), continued by W. G. Foster, D. M. Cattell, A. E. Webster, A. W. Thornton, M. C. Marshall, W. E. Grant, Edmund Noyes, J. Q. Byram, J. D. Patterson, D. M. Cattell, D. R. Stubblefield and closed by Dr. Tileston.

The Executive Board suggested that the courtesy of the floor be extended to the visitors present. Suggestion was accepted.

Moved by W. G. Foster, seconded by J. Q. Byram: "That those taking part in the general discussion shall not occupy more than five minutes."—Carried.

Adjourned at 12.40 to 2 p.m.

Wednesday Afternoon Session.

Meeting began at 2.45 with the president in the chair. Minutes of morning session read and approved.

Dr. D. M. Cattell presented a paper on "Museum" (page 33). Discussion opened by Dr. E. Hillyer and continued by Drs. W. G. Foster, A. W. Thornton, J. H. Kennerley, B. L. Thorpe, H. A. Smith, S. H. Guilford, E. Hillyer, and closed by Dr. Cattell.

A paper on "Recreations" was presented by Dr. J. D. Patterson (page 41). The discussion was opened by Dr. J. H. Kennerley, continued by Drs. J. Q. Byram, D. M. Cattell, E. Noyes, W. E. Willmott, J. Q. Byram, J. H. Kennerley, and closed by Dr. Patterson.

Telegram was read from Dr. W. H. Whitslar expressing regrets at his absence and sending greetings.

Dr. C. M. Wright read his paper on "Physiology" (page 46). Discussion opened by Dr. A. O. Pfingst, continued by Drs. A. W. Thornton, G. W. Cook, A. E. Webster, F. C. Zapffe, H. E. Friesell, G. W. Cook, J. D. Patterson, and closed by Dr. Wright.

Executive Board recommended the "Wisconsin College of Physicians and Surgeons Dental Department" for membership. The college was elected to membership on a ballot vote.

Executive Board reported they had audited the Treasurer's books and found the statement correct as presented.

Adjourned at 5.45 p.m.

WEDNESDAY EVENING SESSION.

President called the meeting to order at 8.30 p.m. Minutes of previous session read and approved.

Moved by J. Q. Byram, and seconded by J. H. Kennerley: "That the secretary be instructed to send a telegram to Dr. Black expressing our regrets at his illness, and our sincere hopes for a speedy recovery. Also one to Dr. W. H. Whitslar acknowledging his telegram."—Carried.

Dr. Edmund Noyes presented his paper on "How Should Ethics and Jurisprudence be Taught" (page 54).

A telegram was received from Dr. J. V. Black expressing wishes for a successful meeting, and his regrets at not being present.

Dr. Noyes' paper was discussed by Drs. Max Eble, M. C. Marshall, J. H. Kennerley, A. G. Friedrichs, H. A. Smith, S. H. Guilford, W. M. Bartlett, A. W. Thornton. On motion Dr. Noyes closed the discussion.

Adjourned at 10.15 to accept the kind invitation of the Falls Cities Dental Club to a "smoker."

THURSDAY MORNING SESSION.

President called meeting to order at 10.45. Minutes of previous session read and approved.

Dr. Cattell presented Dr. Royce's paper on "Faces of Pluggers" (page 70). Discussion opened by Dr. Friedrichs, continued by Drs. J. D. Patterson, M. C. Marshall, D. M. Cattell, S. H. Guilford, A. G. Friedrichs, A. W. Thornton, E. Noyes, W. M. Randall, E. Noyes, H. E. Friesell, J. Q. Byram, A. W. Thornton, and closed by Dr. Cattell.

Adjourned at 12.30.

THURSDAY AFTERNOON SESSION.

Meeting called to order by president at 2.30 p.m. Minutes of previous session read and approved.

Dr. D. R. Stubblefield read Dr. C. N. Johnson's paper on "Operative Dentistry" (page 87).

Dr. S. H. Guilford took the Institute as a class and gave a lecture on "The Physiological Changes which Take Place in the Tissues in Moving a Tooth." (Page 85.) Discussion opened by Dr. J. H. Kennerley, continued by Drs. C. L. Babcock, C. M. Wright, B. E. Lischer, A. E. Webster, W. G. Foster, E. Hillyer, A. E. Webster, H. E. Friesell, W. G. Foster. Drs. Stubblefield and Guilford closed the discussion.

Dr. J. A. Sherwood presented his report as "Master of Exhibits," as follows:

REPORT OF MASTER OF EXHIBITS.

An outline of the exhibits as presented this year is as follows:

Louisville College of Dentistry, specimens and models for teaching anatomy, dental and comparative anatomy, operative and prosthetic technique, crown and bridge work, and orthodontia, also methods of teaching porcelain technique and an outline or short synopsis of each branch taught, students' work in operative, prosthetic, orthodontia technique, also porcelain work in inlays and crown and bridge work.

Vanderbilt University Dental Department—Teaching methods and models in operative and prosthetic technique. Students' work in operative and prosthetic technique, orthodontia and crown and bridge work. Also freehand drawing of sections of teeth.

Kansas City Dental College.—Methods of teaching operative and prosthetic technique, including use of splints in retention of teeth and Richmond metal for swaging caps. Also method of retaining matrices with gutta percha. Students' work in operative and prosthetic technique. Special attention called to Bryant tooth forms, using black teeth instead of white. Students' work in crown and bridge work.

Milwaukee Medical College.—Technique work by students in operative work and orthodontia.

New York College of Dentistry.—Specimens in dental radiographs taken by students. Charts and instructions on the same; also prosthetic technique.

Philadelphia Dental College.—Orthodontia technique with instructions.

University of Buffalo Dental Department.—Teaching models in operative and prosthetic technique with instructions. Students' work in operative and prosthetic technique, porcelain inlays and crown and bridge work. Also students' note-books showing histological drawings.

The exhibits this year are about the same in number as last year, but in most cases somewhat larger. To keep up our exhibits it is necessary to have a better co-operation of the teachers of the different colleges, and to bring this about I would suggest that the deans of the colleges remind their teachers and demonstrators of the necessity of early and ample preparation for the exhibit. Again, I want to say, as has been said before, do not leave your exhibit at home because you have nothing new. Every year the exhibit is held in a different part of the country and your exhibit is new. Bring it out and show what your college is doing and encourage your teachers and demonstrators to take an interest in this meeting and come to this meeting by having them take part in preparing an exhibit which will give them a personal interest here. I hope that next year the exhibit will be much larger and with many more colleges represented. Respectfully submitted,

J. A. SHERWOOD, D.D.S.

On motion the report was received and ordered to be entered on minutes.

Dr. W. G. Foster presented report of committee on "New Appliances and Teaching Methods" as follows, which, on motion, was received and ordered to be entered on minutes:

REPORT OF COMMITTEE ON NEW APPLIANCES AND TEACHING METHODS.

In making out this report I have endeavored to be as brief as possible, because I wish to draw your attention to one principal fact, and hold it there, so that with your co-operation our meetings may be more successful in the future.

The Committee on New Books and Dental Appliances has not had the success it confidently expected in securing reports of the books and appliances to be presented at this meeting.

With the hope of receiving such reports, the committee sent out typewritten letters to all they thought would be interested, requesting those who anticipated sending books and appliances to the meeting of the Institute of Dental Pedagogics, to submit a written report (of such books and appliances and describing articles to be presented) thirty days prior to said meeting to the chairman of this committee.

This was done also for the purpose of explaining more fully that the master of exhibits has no jurisdiction on this subject.

It was the committee's intention to read the report of each exhibitor and incorporate all, or a part of each, with the committee's report to this body.

In this way it was hoped a more comprehensive report could be submitted, as it is almost impossible, in the constant hurry between sessions, to find the exhibitors who have brought appliances, or find them ready to give the time required for explanation.

Many members will assure one that they will gladly come to the room of exhibits and give a detailed account of their appliance as soon as they have heard such and such a paper.

When they come, if they come at all, it is usually at a time when another member is trying in a hurried manner, to explain the appliance of some other member unable to attend the meeting who has sent his appliance by a friend who does not in the least understand it, and who is finally obliged to confess he does not, after having taken up much valuable time.

To show you how these seemingly trifling matters interfere with the success of your committee I will state that in reply to the many letters sent out none were received that gave us any of the desired assistance.

Some, indeed, wished to know what this committee had to do with the matter, as they understood such things were to be referred to the master of exhibits, etc.

Now, if this committee is to have any success, it is necessary for it to be better understood by the members, and, doubtless, it will require a few more meetings for a better understanding of what is required of this committee, and what is expected of the members in order to assist the committee.

In order that all might understand what this committee is expected to do, and to fully impress this body with the aim of its work, it ought to be placed nearer the front of the program than it is, if the committee is to be of real use to the Institute of Dental Pedagogics.

Last year your chairman read his report to the officers of the Institute.

They were there to hear because they could not leave until everything was finished.

This year there is no mention of the New Books and Appliance Committee in the booklet mailed to members.

I am therefore not surprised that members write to know what this committee has to do with the matter.

This committee suggests that it be merged with the one in charge of the exhibits; that is to appoint the master of exhibits and a master of new books and appliances (if I may be permitted to coin a new title)

In this way there need be no complications, as, should a report be sent to the master of exhibits he could at once forward it to the master of new books and appliances.

Then, these masters could assist one another very much durng the meeting.

This season the committee has only accepted appliances invented since the last session of this school.

In closing this report I would only reiterate the principal fact that I mentioned at first—which is the great necessity of a better understanding of the duties of the committee and the assistance necessary by the members to insure any degree of success for the meeting.

It requires the interest and co-operation of each exhibitor, and they will find, by a little timely aid in preparing their reports and sending them as requested, that the meetings will not only be much improved, but greater justice will be done their exhibits and more interest manifested in them.

UNIVERSITY OF BUFFALO.—New models for teaching operative technique. Plaster models with cavities cut in them with outlines of each wall colored and each model numbered. These show the general outline of cavity, its proper shape and bevel of wall. They are placed in the laboratory under glass cases where all can see them and directions for shaping cavities are posted above the model.

ROYAL COLLEGE OF DENTAL SURGEONS.—Dr. A. E. Webster presents articulated tooth form, upper and lower teeth carved from vegetable ivory and vulcanized into flexible rubber. The bows of a Kerr articulator are vulcanized into the rubber so they may be firmly held on the articulator. This is a requirement in the dental anatomical technique.

KANSAS CITY DENTAL COLLEGE.—Bryant's tooth forms, special feature, black teeth instead of white, as they are denser, cleaner and show character of work better than old forms. These forms were suggested by Dr. J. P. Root. Forms for crown and bridge work, mounted and ready for crowning.

NEW YORK COLLEGE OF DENTISTRY.—Exhibit of student X-ray technique, with accompanying pictures and data. Exhibit of practical soldering technique.

LOUISVILLE COLLEGE OF DENTISTRY.—Soft rubber made on a hard rubber model, used for impressions, articulation and the adjusting of plate after vulcanized. Outline work, prosthetic dentistry as taught didactically. Outline work for physics as applied to dentistry, didactically.

VANDERBILT DENTAL COLLEGE.—Free-hand drawing of tooth surfaces. Each student is required to draw thirty-six pictures. This work belongs to the course in dental anatomy. Also the assembling of study teeth and stringing on wire, each student selecting, according to his own judgment, a tooth from a quantity of extracted teeth placed before him that have just been described by the lecturer. After each tooth has been described and one selected by the student, he will assemble all the teeth on one side of the mouth in proper order, upper and lower, and string them on wire, with his name attached and hand them to the instructor.

Would state that books have not been presented at this meeting as formerly.

W. G. FOSTER, *Chairman.*

Adjourned at 3.55 to accept invitation of the faculty of the Louisville College of Dental Surgery to visit their building.

THURSDAY EVENING.

The Institute was tendered a complimentary banquet by the Louisville College of Dental Surgery in the Galt House.

FRIDAY MORNING.

President called meeting to order at 10.10. Minutes of previous session read and approved.

Dr. H. J. Goslee presented an addition to the constitution as follows:

That Section 4 of Article IV. be designated as Section 5, and the following paragraph incorporated as Section 4:

"Any teacher having been an accredited delegate to this body for three or more years from a school in good standing, may, in the event of withdrawing from the faculty of such school, be made a *permanent* member—without vote—by a two-thirds affirmative vote of the members present."

Moved by H. J. Goslee, seconded by J. H. Kennerley: "That this addition to the constitution be adopted at this session."—Carried unanimously.

Dr. J. H. Kennerley gave notice to amend the constitution as follows:

That Sections 2, 3 and 4 of Article IV., respectively, be designated as Sections 3, 4 and 5, respectively, and the following incorporated as Section 2:

"In the event of the withdrawal from the National Association of Dental Faculties of any school holding membership in this Institute, such membership may be retained at the request of the accredited representative of such school by a two-thirds affirmative vote of those present."

Moved by H. J. Goslee, seconded by A. G. Friedrichs: *Whereas,* Dr. James H. Worman in his official capacity as United States Consul at Munich, Germany, has been untiring in his efforts to have the government of that country advised of the illegal manner in which some diplomas, purporting to confer the American degree of Doctor of Dental Surgery, had been obtained, and

Whereas, Through his efforts the holders of bogus diplomas were refused a license to practice, and in many instances prosecuted, and the suppression of the "schools" granting them thereby made possible, therefore be it

Resolved, That the Institute of Dental Pedigogics hereby most heartily thanks Dr. Worman for the untiring efforts which he has made in presenting to the authorities of Germany the true status of dental education and dental educational institutions in the United States.

Be it further resolved, That a copy of these resolutions be forwarded to Dr. Worman.

The following letter was received in reply to the above resolution:

CONSULAR SERVICE, U.S.A.,
THREE RIVERS, P.Q., February 4, 1905.

Dr. W. Earl Willmott, Secretary and Treasurer Institute of Pedagogics,
93 College Street, Toronto, Ont.:

Sir,—I have the honor to acknowledge the receipt of your letter of January 31, 1905, accompanied by a copy of resolution passed at a meeting of your Institute at Louisville during Christmas week. Permit me to add that I am deeply touched by this generous commendation from a quarter where I have never even had the advantage of a personal acquaintanceship. If such a spirit of appreciation shall come to prevail in the profession we may yet hope for the early rehabilitation of the academic degrees of your professional schools in the world of international life and practice. Respectfully,

JAMES H. WORMAN.

On motion of Drs. Friedrichs and Goslee it was decided to proceed with election of officers for the ensuing year.

An informal ballot was taken for president, and on motion of Drs. Friedricks and Stubblefield the ballot was made formal, and Dr. S. H. Guilford declared elected president.

An informal ballot was taken for vice-president, and on motion of Drs. Friedrichs and Goslee the ballot was made formal, and Dr. D. R. Stubblefield declared elected vice-president.

Moved by Dr. Goslee, and seconded by Dr. Byram: "That the rules be suspended and the president cast a ballot for Dr. W. E. Willmott as secretary-treasurer."—Carried.

The president declared Dr. Willmott elected secretary-treasurer.

As Dr. R. H. Nones' college had resigned from the N. A. D. F. he was no longer a member of this organization, and an informal ballot was taken for member of Executive Board for one year.

On motion of Drs. Byram and Friedrichs the ballot was made formal, and Dr. J. H. Kennerley declared elected chairman of Executive Board.

An informal ballot was taken for a member of the Executive Board for three years. On motion of Drs. Byram and Friesell, Dr. E. Hillyer was declared elected.

Dr. E. Hillyer presented his paper on "A Practical Course in

Soldering" (page 94). Discussion opened by Dr. G. H. Wilson, of Cleveland (read by Dr. Stubblefield), continued by Drs. J. A. Sherwood, S. H. Guilford, W. M. Bartlett, J. D. Patterson, E. M. Kettig, H. J. Goslee, B. N. Pippin, G. W. Cook, and closed by Dr. Hillyer.

Moved by Dr. E. Noyes, seconded by Dr. J. D. Patterson: "That we, the members of the Institute of Dental Pedagogics, take great pleasure in expressing our hearty thanks and appreciation for the courtesies and entertainment extended to us by the Louisville College of Dentistry on our visit to their school and in the banquet last evening. We congratulate the school upon its convenient and beautifully located building, admirably arranged and equipped for its purpose. The banquet gave us all an evening of unalloyed pleasure, and will remain a delightful memory."—Carried unanimously.

Moved by Dr. A. W. Thornton, seconded by Dr. H. J. Goslee: "That the members of the Institute of Dental Pedagogics at this, its twelfth annual meeting, desire to express to the Falls Cities Dental Club their deep appreciation of the courtesies extended to them and the unique entertainment prepared for them during this meeting."—Carried unanimously.

Dr. G. W. Cook read a paper on "A Few Important Features in Teaching Pathology to Dental Students" (page 105). Discussion opened by Dr. F. C. Zapffe, and continued by Drs. Weidner, A. G. Friedrichs, C. M. Wright, J. D. Patterson, and closed by Dr. Cook.

Dr. Kennerley explained that Dr. Printz was prevented by illness from having his discussion ready to present.

Moved by Dr. H. J. Goslee, seconded by Dr. W. E. Grant: "That Dr. Printz's paper be read by title and published in the transactions." —Carried. (Not provided on account of illness).

On motion the courtesy of the floor was extended to Mr. R. Brewster, of Chicago, who presented a few remarks on "Masticating Surfaces of Artificial Teeth." (Page 117).

Moved by Dr. H. J. Goslee, seconded by Dr. W. E. Grant: "That Drs. W. H. Whitslar and G. H. Wilson, of Cleveland, be elected to permanent membership in the Institute."—Carried.

Moved by Dr. H. J. Goslee, seconded by Dr. W. E. Grant: "That the president and secretary give creditentials to Drs. T. Brophy, J. D. Patterson, H. A. Smith, S. H. Guilford, F. D. Weisse and any others who may attend, as delegates to the International Educational Commission."—Carried.

Moved by Dr. J. H. Kennerley, seconded by Dr. H. J. Goslee: "That we extend our hearty thanks to the management of the Galt House for the courtesies shown the Institute."—Carried.

Moved by Dr. H. J. Goslee, seconded by Dr. J. H. Kennerley: "That the president appoint a committee on curriculum."—Carried.

President appointed Drs. G. E. Hunt, W. E. Grant and H. J. Goslee as the Committee on Curriculum.

Officers elect were introduced and responded with a few appropriate remarks.

Minutes of session were read and approved. Meeting adjourned *sine die* at 1.45 p.m.

W. E. Willmott, *Secretary.*

The Executive Board subsequently decided the next meeting would be held in New York, on December 28, 29, 30, 1905.

Appendix A.

List of membership colleges with duly accredited representatives present, dues paid and entitled to vote:

Northwestern University Dental School, Chicago, Ill.—E. Noyes

Dental Department Vanderbilt University, Nashville, Tenn.—D. R. Stubblefield, D. M. Cattell.

Louisville College of Dentistry, Louisville, Ky.—W. E. Grant, W. M. Randall, J. B. Jordan, E. H. Hubbard, H. B. Holmes, P. F. Barbour, A. O. Pfingst, H. B. Tileston, W. T. Yager, E. M. Kettig, Max M. Eble, H. K. Kellogg, B. D. Rivers.

Royal College of Dental Sugeons, Toronto, Ontario.—W. E. Willmott, A. E. Webster, E. C. Abbott, A. W. Thornton.

Marion Sims Dental College, St. Louis, Mo.—M. C. Marshall.

Washington University Dental Department, St. Louis, Mo.—J. H. Kennerley, B. E. Lischer, W. M. Bartlett, B. N. Pippin.

Pittsburg Dental College, Pittsburg, Pa.—H. E. Friesell.

New York College of Dentistry, New York, N.Y.—E. Hillyer.

Illinois School of Dentistry, Chicago, Ill.—F. A. Zapffe, G. W. Cook.

New Orleans College of Dentistry.—A. G. Friedrichs.

Tufts Dental College, Boston, Mass.—Charles P. Thayer.

Wisconsin College of Physicians and Surgeons, Dental Department, Milwaukee, Wis.—C. L. Babcock.

Chicago College of Dental Surgery, Chicago, Ill.—H. J. Goslee.

Ohio College of Dental Surgery, Cincinnati, Ohio.—H. A. Smith, C. M. Wright.

Indiana Dental College, Indianapolis, Ind.—J. Q. Byram.

Kansas City Dental College, Kansas City, Mo.—J. D. Patterson.

University of Buffalo, Dental Department, Buffalo, N.Y.—J. A. Sherwood.

Baltimore College of Dental Surgery, Baltimore, Md.—W. G. Foster.

Philadelphia Dental College, Philadelphia, Pa.—S. H. Guilford.

Visitors: Burton L. Thorpe, St. Louis, Mo.; Robert Brewster, Chicago, Ill.

Membership colleges without representatives: College of Dentistry, University of Minnesota; Dental Department, Western Reserve University; Dental Department, University of Michigan; Dental Department, University of California; University of Iowa, College of Dentistry; Birmingham Dental College; Dental Department, University of Pennsylvania; Southern Dental College; Pennsylvania College of Dental Surgery; Dental Department, Milwaukee Medical College; Dental Department, Ohio Medical University; Dental Department, University of Omaha; Keokuk Dental College; New York Dental School; College of Dentistry, University of Southern California; Howard University; Colorado College of Dental Surgery.

Colleges represented by delegates, 19; colleges not represented, 17; colleges admitted at this meeting, 1; colleges dropped for non-payment of dues, 2; colleges resigned, 1; present membership, 36.

W. E. WILLMOTT, *Secretary-Treasurer.*

Toronto, January, 1905.

Address of Welcome.

By Judge A. P. Humphrey.

Dr. Tileston and Gentlemen,—It gives me great pleasure to welcome you to the city of Louisville. When Dr. Tileston asked me to come here to-day and bid you welcome, he probably felt that he owed it to me, because, generally, when I am in his hands, I am one degree worse off than Balam's ass, I am allowed to open my mouth, but I cannot talk. (Laughter.)

I am glad to see you here. Don't let the cold weather frighten you. We had a few warm days and the present cold spell was ordered for the purpose of keeping you here with us as long as possible. This institution must be a very interesting and profitable one to its members and the community at large. Lord Bacon's saying is true: "Reading makes a full man, talking a ready man, but writing an exact man." But what makes an exact man even more than writing is teaching. A man never knows the extent of his knowledge until he tries to teach. He never appreciates his limitations until he begins to impart knowledge. Then he must find out how much of the truth there is in him, because unless it is the truth it will not bear examination.

There can be no doubt that the science of dentistry has advanced enormously. Not many years ago the dentist, in the common mind, was a mere mechanic. It was not considered an intellectual pursuit, pursuit which took hold of the highest realms of science. All that has passed away because of the teaching of dentistry; because of there being established schools for the purpose of teaching that particular science. Not as a mere adjunct to some other school, what might be called a by-product, but schools of dentistry are as scientific as schools of engineering, schools of law, of medicine and the other learned professions.

Furthermore, we have learned to appreciate the dependence of each member of the body upon every other member. The eye cannot say to the foot, "What need have I of thee?" All the parts of our bodies are so peculiarly joined together and so dependent on each other that until we study carefully the separate members we cannot know how closely they are united and how dependent on each other. The result is that when the science of dentistry became a science that was to be taught by itself, it necessarily broadened out. So that I doubt not that now the accomplished dentist knows as much about the whole human body as does the surgeon or physician.

In broadening out your knowledge, in making it more exact, in giving us a new science, it seems to me that this institute is doing a noble work, and I welcome it as a sign of advancing intelligence, a higher intelligence, and the highest professional education. Seriously, I say to you, that in my judgment, nothing has been done for the comfort and the health of the community of more importance than has been done by the schools of dentistry.

Therefore I welcome you, and I hope that meeting one with the other you will be inspired to further effort and higher aims. (Applause.)

Response to Address of Welcome.

By Dr. J. D. Patterson, D.D.S., Kansas City, Mo.

I am sure that we all appreciate the broad-mindedness and cordiality of Mr. Humphrey's words of welcome, and we thank him very kindly, indeed, and through him the people of Louisville. We are glad to be here.

This association was formed because those who designed it believed, as I believe, as we all believe, that there is a great field and future for dentistry, for dental education, for dental teaching. In order to get the best out of the dental profession, so that it may minister best to the comforts of the human race, it was necessary that the dental teachers should form an institute where we should discuss teaching methods and nothing else, so that we might become more useful.

So we come together year after year to add our little mite to the knowledge each teacher has, and thus add to the sum total of usefulness of this association. I feel like saying "All Hail" to the men like Dr. Black, Dr. Cattell and others who are the founders of the old National Technic Association, which is now the Institute of Pedagogics. All honor to them!

Our presence here shows our belief in this association. We bring what we can, "Never a star was launched but its fine rays took some shade of darkness from the night." "The little stream which sings beneath the fern, brings welcome increase to the ocean's might." So the smallest thing we can bring, we bring, and we bring it honestly.

Again, I wish to thank Judge Humphrey for his gracious words of welcome. He has an appreciation of the status of our profession which I wish were universal, to make it universal is one of the reasons for meeting here to-day. We appreciate that our profession does not occupy in the minds of the vast majority of the people its proper status, and we desire to place it upon a higher plane. We desire to be considered not only the best in dentistry, but we also desire to be considered the country's best citizens. To be its best citizens we must be the best men in our profession. And that is why we are here. (Applause.)

The Preliminary Educational Requirements and the Curriculum.

H. B. Tileston, D.D.S., Louisville, Ky.

President's Address.

In assuming the duties appertaining to the position of presiding officer of this distinguished body, I confess to a feeling of diffidence not unmixed with pride, and more than common satisfaction. The sense of diffidence arises from a contemplation of the long list of my illustrious predecessors, whose fitness for the office and brilliant administration of its duties, I cannot hope to emulate.

The feeling of pride is naturally consequent upon a deep appreciation of the honor conferred upon me in being chosen president of this Institute, while the more than common satisfaction comes from the fact that I am permitted to welcome you most heartily on this occasion, to my own city, and to express the earnest wish, which I voice on behalf of all my local confreres, that this may be not only one of the most profitable and instructive, but also one of the most pleasant and enjoyable sessions you have ever known.

Since our last convention in Buffalo our parent body, the National Association of Dental Faculties, has passed through a turbulent period which at one time threatened the disruption of that organization. During that unsettled time it was a matter of deep concern with your president as to what might be the fate of the Institute of Dental Pedagogics should the Faculties' Association cease to exist. In a letter written to the secretary at that time, I expressed the purpose, if the worst came to the worst and the Faculties' Association went to pieces, of addressing a letter to the colleges, calling upon them to rally about the Institute and to preserve it at all hazards; and ventured the suggestion that the Institute might ultimately prove the salvation of the Faculties' Association. The secretary, in his reply, heartily endorsed this sentiment. Happily the danger is passed, but it is not impossible that such a contingency might arise again, and there should be an unwritten resolution among the colleges that so useful and beneficial an organization as the Institute of Dental Pedagogics has proven to be, shall never be allowed to perish. Right worthily has it fulfilled the purpose of its being, and eminently deserving is it, to be perpetuated.

Eleven sessions of this body have preceded this one, and for these meetings the Executive Boards, to whom is entrusted the work of arranging the programs, have apparently exhausted every subject and every phase of every subject which could properly be brought before this organization for discussion. In spite of this seeming poverty of material our present Executive Board presents for this twelfth session a program of more than usual varied and instructive interest, and the Institute is under obligations to the members of this board for their untiring efforts in the face of extraordinary difficulties. I take this occasion to express my own grateful acknowledgments to Dr. D. R. Stubblefield, the genial and efficient chairman of the Executive Board, for his persistent and well-directed labors in behalf of the success of this meeting.

It need not be discouraging to future Executive Boards that the field has been so thoroughly gleaned in the past, for the time has now arrived when old subjects may be profitably discussed again, with the positive assurance that in the natural course of development inseparable from as progressive an organization as this, old things will have become new. I would suggest that the next meeting be devoted largely to the subject of technics, which has notably slipped out of our programs since we assumed the more pretentious title of "The Institute of Dental Pedagogics."

The subject or subjects to which I wish to direct your thoughtful consideration are, the "Educational Requirements Preliminary to Entrance upon the Study of Dentistry," and the "Dental College Curriculum," subjects so closely co-related that they may be quite properly considered under one head and referred to as a "Subject."

Taking up, then, the first division of our subject, it is suprising from how many view-points the question of preliminary educational requirements may be surveyed and how diverse the views presented.

From the point of view of the dentists in practice, a high preliminary requirement offers a means of limiting the influx of new practitioners to become competitors in a field considered already crowded. To very few indeed does it present as a desirable means for the elevation, socially and ethically, of their profession. It is hardly reasonable to expect that the vast majority of those in practice should welcome the advent into the profession of large numbers of men, equipped by education and scientific culture, to create and occupy higher places in the community than they have been or ever will be able to reach.

To the general public that discriminating yet indiscriminate court to which every graduate in dentistry must make his final appeal, the quality or quantity of preliminary education of its chosen dentist, considered merely as such, is a matter, in most instances, of small importance.

Communities differ as much as do individuals. What would be entirely acceptable in one community would be wholly unsatisfactory to another. The dental practitioner will find his level as surely as will water. And there are as many levels as there are grades of society, or rather grades of culture, in each community, and each one has its need of dental service which must be supplied by a dentist fitted to each particular grade. In our enthusiasm for higher and higher preliminary educational requirements we are apt, I think, to overlook this important point of view.

A large majority of the American dental colleges are private institutions founded as business enterprises, and the deans, or the officials under any other name whose duty it is to manage the business, are looked to by those financially interested, to make the enterprise pay. These same officials are also frequently members of the teaching faculty. The character they must assume, therefore, is a kind of Pooh Bah. Upon occasion they step with noble mien to one side of the stage, and with lofty grandiloquence declare for a higher preliminary educational requirement—nothing less than an acedemic degree will satisfy them. Next they appear at the other side of the stage in the capacity of business managers, diligently searching every nook and corner for students whose fees are absolutely essential in order that even the tremendous expenses of a properly conducted dental school may be provided for. In viewing this question of preliminary educational requirements, these deserving and over-worked deans are apt to see double.

The view point which most concerns this Institute is that of the teacher, and it is essentially different from any of the aforementioned, although his opinion must of necessity be more or less influenced by them. His view is more disinterested; of selfish motives he has none, except that he must recognize the responsibility which rests upon him for the character of those who go out from under his instruction. He knows that when a graduate from a dental college discredits his profession, the first insinuating query is, "What kind of teachers must this man have had?"

Do we as dental college teachers recognize, do we *feel* the need of a better preliminary education of the students we essay to instruct? Hardly is it necessary to reply, that we certainly do. Who that has been teaching for some time but has noticed the marked improvement in recent years, in the character of the units comprising our classes, and the greater ease and satisfaction with which we can impart our instruction. This comes, of course, as a natural consequence of the gradual, wisely gradual, advance of the preliminary educational requirement. But there is much yet to be desired. Not only must the present requirement be advanced, but the present and any future requirements must be rigidly enforced.

One of our eminent members has for years consistently held out for higher preliminary educational requirements as the solution of many of the troubles of the Faculties' Association, while another equally eminent member has as consistently opposed any advance until the requirements we have are enforced. It is not my intention, nor is this the proper time or place to indulge in animadversions upon this topic.

The colleges are now operating under a resolution of the Faculties'

Association which provides for the gradual advancement of the preliminary educational requirement to graduation from a high school or its equivalent. There is no intimation in the resolution of any purpose to advance beyond that, and I am definitely of the opinion that as an *imperative* requisite, it should stop there.

It is contrary to the spirit of the institutions of this country, whose proudest boast is freedom, that an insurmountable obstacle should be placed in the way of thousands of ambitious and deserving young men and women who are capable of becoming acceptable and even ornamental members of the dental profession, by making an entrance requirement beyond that which may be obtained *free*.

The time may come when higher education, and I apprehend that term to mean education that must be paid for, and consequently beyond the reach, at present, of any but the well to do, will have become so widespread in this country, that an academic degree may be made a requisite to entrance upon the study of dentistry; but not now, nor for a long time to come.

I would not be understood to under-rate the desirability of degree men entering the profession of dentistry. Indeed, I heartily favor the giving of actual time credits to such men, as an inducement to them to enter the dental colleges.

The results of the most conscientious efforts on the part of a teacher to instruct from the lecture platform, pupils who are inattentive, are meager indeed. If the lecturer lapses into an amusing story, or the relation of a personal experience, such pupils immediately become attentive, involuntarily attentive, but as soon as the subject becomes prosy, their minds wander off to something easier to think about. Prof. Barrett Wendell, of Harvard University, in a recent article says: "It is precisely this faculty of voluntary attention which education, in the broadest sense, can most surely cultivate."

From the view-point of the teacher, a higher preliminary educational requirement, sufficient at least to insure ability to quickly and intelligently grasp the instruction given, and to give voluntary attention to the subject in hand, even though it be in a measure uninteresting as compared with some others, is absolutely essential.

The curriculum has for some years past occupied a large share of the attention of this Institute. There appears to have been a tendency on the part of some, to include in the dental college course of study, fragments of every science and art that could possibly be considered as even remotely corelated to dentistry. If all the suggestions which have been seriously made had been adopted, a dental college would now be a concentrated academy of science and art.

It was due to the insistence of this Institute in its demand for more time in which to teach the subjects which had been, and which were desired to be added to the curriculum, that the Faculties' Association was led into the error of adopting a four years' course; the retreat from which brought down upon the devoted heads of the colleges more criticism than any action that body has ever taken. Not even "the treason of '97" was a circumstance to it.

The length of the course in dentistry may now be considered as definitely settled at three years, at least for a long time to come, and the curriculum, which has been padded out in anticipation of a four years' course, is too much congested when crowded into three years, even with the lengthened term. Especially is this noticeable in the junior year, in which subjects are carried over from the freshman year, and many that are found in the senior curriculum are also in the junior, with the result that in most of the colleges the juniors have from fifteen to twenty subjects which they must take didactically, clinically or in laboratories, and upon which they are required to pass creditable examinations.

In university courses leading to the degree of B.S., B.A., or M.S., the number of studies per term is usually seven to ten.

It is manifestly impossible for a class of students, many of whom lack the educated faculty of voluntary attention and sustained mental effort, to grasp effectually the flood of matter poured out *to* them, if not *into* them, hour after hour and every day, by a dozen or more teachers, each presenting a different subject. Especially is this true of those subjects which do not appeal to the student as relevant to dentistry, and which he has, therefore, made up his mind beforehand to pay but little attention to. Nor is it possible in many of the, may I say extraneous subjects, now a part of our curricula, in the limited time allotted to them, and especially when taught, as is frequently the case, by teachers who know but little of the subject themselves, to impart enough information to be really worth while.

A little smattering of knowledge of a great many things is not particularly dangerous when acquired merely for one's own gratification. A little learning becomes dangerous only when it is attempted to be applied to others, especially in the treatment of disease.

The Earl of Derby, Lord Rector of Glasgow University, in his inaugural address in 1869 said, "The best thing is to know your subject thoroughly—the next best to know nothing about it, and to be aware that you do know nothing—the worst is to know a little, and to know that little vaguely and confusedly."

I am of the opinion that effort from now on should be directed to constriction rather than expansion of the curriculum, to the elmination of those subjects of questionable relevancy to dentistry and its practice, the teaching of which tend not only to confuse the minds of students on those subjects, but also to lead to more or less confusion as to those which must be considered essential.

The trouble with our system is, that it is based upon the presumption of a very narrow educational foundation, and we propose to broaden out upon this during the college courses, until the resultant cone, referred to by Sir Michael Foster in his much-quoted address before the International Dental Federation, stands poised upon its apex, rather than firmly seated upon a broad base. We lose sight of the fact that preparation for a profession is necessarily a narrowing and not a broadening process.

The question which life asks of us all, especially in the pursuit of so practical a profession as dentistry, is not "What do you know?" but "What can you do?" It is the province of the dental college to teach men not only to know, but more essentially, to *do* things. To this end more than half of the time of the student is devoted to instruction in laboratories and the clinic, and this time should be increased rather than infringed upon.

I would suggest that the curriculum committee, if we have such a one, or if not, that such a committee be appointed to arrange a curriculum based upon the reasonable hypothesis that, in view of the advanced preliminary educational requirement, and in anticipation of that requirement, soon reaching graduation from a high school, we have a right to expect students to enter upon the study of dentistry already equipped with a knowledge of many of the subjects which are now included in our curriculum; and that this committee direct its efforts to the relief of the present congested junior curriculum.

In conclusion, permit me to thank you for the distinguished preferment with which you have honored me, and to ask your kind indulgence while, to the best of my ability, I administer the few rules and regulations necessary to keep so dignified and decorous a body in order.

Discussion.

Dr. J. B. Willmott, Toronto.

Mr. President and Members of the Institute of Dental Pedagogics,—The excellent address of our president has placed before us one of the *live* questions in dental education. The answer to the question, "What should be the preliminary educational requirement" of the student of dentistry will probably be as varied as the point of view of the questioners. The practitioner who has had the advantage of a good education himself and in his profession finds himself associated with many men of very limited education and less culture will answer that the standard should be high to give a better standing to the profession. The men who expect dividends from money invested in a dental school would probably say, if they dared, that the present requirements are so high that many capable young men are excluded from dentistry. From other standpoints we might obtain other views. Someone may ask why require any standard of preliminary education? Why not admit anyone who has money enough to undertake and pluck enough to go through a course of dental instruction. We reply—

First:—To ensure that students of dentistry have already acquired, to some extent at least, the study of systematic and persistent study. Those of us who were trying to teach dentistry in the days when no standard of education was required, have frequently seen men with good abilities, oftentimes with valuable and successful business experience, who in the absence of the acquired habit of systematic study, work hard, even to the point of mental and physical exhaustion, and accomplish little or nothing, while men of inferior ability but with school training, would, with comparatively little effort, successfully complete the course.

Second:—That students of destistry may have minds sufficiently alert and trained to readily grasp and assimilate instruction given them in "good English." I emphasize the "good English." The men naturally attracted to dentistry are those who have the constructive instinct. They want to make things and enjoy the making—not unfrequently they do not love study. If they are to make intelligent practitioners they must be obliged to pursue scholastic studies until their minds have been trained so that they can, with pleasure as well as profit, listen to and apprehend the "why" and the "when" of an operation, as well as skilfully perform it. This point has been well emphasized by our president.

Third:—To eliminate from the course in dentistry by exclusion, that somewhat large class of young men who desire to follow some calling which will give them a reasonably good social position but who have not either the ability or the application to successfully pursue a high school course. I heard once of a fashionable secondary school of which one of its teachers affirmed that it was a cross between an idiot asylum and a reformatory, one-half the boys were there because they could not learn anything at home, and the other half because they would not. We need a "preliminary standard" to exclude both these classes.

Fourth:—That the dental practitioner may meet the members of other professions, physicians, lawyers, clergymen, engineers, bankers, teachers, etc., on the same plane of general intelligence and culture.

Fifth:—That the dental practitioner may be intellectually the equal of the great majority of his patients. To a greater extent than any other professional man a dentist is, for hours at a time, brought into personal intercourse with his patients. The ability to maintain intelligent conversation with educated people is a very important factor in his professional success. On this account general information and mental culture has for the dentist a greater money value than it has in any other calling except, possibly, that of the literateur.

Sixth:—That the dental practitioner may be prepared to discharge all the higher duties of citizenship in the community in which he resides. No one more than the dentist requires to get away from the rut of the daily routine of his office work. Probably the very best way to do this is to interest himself in the educational, municipal, political, ecclesiastical and social life of the locality, in other words to be a "good citizen." To do this efficiently and usefully to himself and others he should in general intelligence be at least the peer and preferably the superior of those with whom and for whom he acts.

In emphasizing the importance of a good preliminary education, as a preparation for the serious work of life, we would neither overlook nor underestimate the value of three years of faithful application to the scientific studies involved in a modern dental education. No one can thoroughly master the course and at its completion be an uneducated man. We have all seen how the bright, but raw and uncultured country boy has in three years at college developed into the cultured gentleman with an ease of manner which will pass him creditably in any society.

How much preliminary education may be required as a minimum? Certainly not less than the equivalent of three years' high school work. This much is necessary to master the elements of the subjects of the school course so that the study may be continued after the school has been left behind. Less than this will not give the desired mental training and habits of study.

In the present state of primary education it is not possible to insist on any special training previous to entering on the study of dentistry. Nor, with the possible exception of manual training, is it desirable. There are certain foundation subjects of study which all young people should master, no matter what their future calling. The ordinary high school curriculum probably comes as near to realizing this ideal training as educationists have yet been able to reach. Environment may sometimes fix the minimum of "preliminary education." In the country, where the writer resides, the completion of the four years' course of a good high school has been fixed as a sort of universal matriculation standard admitting to the Arts Faculty in the Universities, to the teaching profession, to the study of medicine, law, engineering, etc. Were the dental college to adopt a lower standard the dolts and idle and unsuccessful students would naturally gravitate into dentistry. We have therefore for eight years past accepted nothing less than the equivalent of the successful completion of four years in the high school.

I have not time left to discuss the curriculum. The school with which I have the honor to be associated, is the only member of the N. A. D. F. to stick to the course of four sessions of seven months each. We were quite of the opinion that the subjects which it was desirable to teach were too much for a three-session course, but instead of following the plan suggested by our president of eliminating some of them, we thought it wiser to extend the course so as to make room for them. So far as I can now see, in the middle of the second year of the new course, we shall have no difficulty in keeping our students usefully employed till the last day of the fourth session and shall then probably regret that they are not better prepared to enter successfully on their life work.

Dr. W. G. Foster,
Baltimore.

Mr. President and Gentlemen,—I believe the present preliminary requirements are sufficient. If we advance these to a four years' high school course, it will mean that the young man will be twenty before he can enter college; add to that three years of study, and two years before he can acquire a paying practice—half the life of the average man. The tendency in the larger universities is to shorten the course somewhat. Dr. Butler, of Columbia, reduces the time of certain studies; for instance, two years for medicine and law, and four years for philosophy. But our preliminary requirements, if adhered to properly, are sufficiently high. The education of the student does not cease the moment he enters college, it goes right on. He takes up new studies and continues old ones.

Dr. D. M. Cattell,
Nashville, Tenn.

Oh, for Tom Weeks and two others! Gentlemen, let us not forget the object of this institution. Some of you who attended this body in its inception will not forget the fight we had to hold this institution where it belonged, and now I must raise a note of warning once more—because we are forgetting. If you will hark back to 1894-5, and of the hard work some of us had to keep legislation out of this body, and to make the institution what it is, I believe you will agree with me that the reason we are what we are to-day is because we have kept legislation out. Now, please, let us not fall. We have a clause in our constitution that specifies positively what we are gathered together for, and that is *not* legislation. If we continue to prosper and expect to be a real teaching body or normal school, we must leave the law element out of our work. I am glad that the president again called attention to the fact that we are losing sight of the technical department. For the last few years that has been almost forgotten, except in the exhibit room, and it is time we were returning to it again. We have nothing to do with preliminary requirements, length of term, curriculum, graduating requirements, etc. The moment we go into that line of work we will fail as teachers. *What* is to be taught or to *whom* the teaching is given are not matters for this body to discuss. The one object of the Institute is to *teach teachers how to teach*. Let us not lose sight of that fact.

Dr. A. E. Webster, Toronto, Can. I rise to speak of one part of the paper, the reference to our program and what this body might do. I believe the preliminary education part of it should go. There is plenty of room for discussing teaching methods. Many subjects have not yet been brought before us that might well be brought up. There are three general teaching methods, the lecture method, the recitation method and the clinical or demonstrating method. So far as I can see, this Institue has confined itself largely to the lecture method of teaching. There are a few present, perhaps, who are recitation masters. How many demonstrators are here? Clinicians who are not professors? I have been a constant attendant at these meetings for the past nine years, and I have never heard infirmary methods discussed. I mean methods of teaching at the chair-side. Why is it that the men who organized this Institute are not here to-day? They recognized the necessity for technical teaching in dentistry. Where are they? Much in dentistry depends on our technical teaching, and we have gotten away from it.

Dr. A. W. Thornton, Chatham, Can. Do you not think it a wise thing for this Institute to determine what shall be taught before we try to settle how to teach it? That, I think, appeals to the commonsense of most of us. Would it not be a misfortune to emphasize too largely the manner of teaching that was referred to slightly by the president in his address. Indeed, although we should refer to the "know" and the "do" of the student, it is well to teach *how* to do rather than to emphasize what to know. Has that not been the mistake of dentistry for many years? And have we not many men practising dentistry who can do beautiful operations, and yet when we come in contact with them we find, to a great extent, that they are boys? That has had a great deal to do with the low standard that dentistry occupies in this country. We listened to an address this morning from a member of the bar. If I mistake not, the president in his address referred to the different grades of society, suggesting that we would have to have dentists corresponding to these grades, men fitted for the society among which they are to practice. Is that not rather an unfortunate position to take? I am sure that would not be endorsed by the eminent jurist who was here this morning. We do not have a lawyer to try the underscum, the middle class and the 400. The moral of this is, Let us raise the standard of dentistry as high as possible, not attempting to fit them for various grades of society. There was a keen shot thrust at the deans and the different positions they take upon the platform; from one side looking at the exalted position we should occupy, and from the other the absolute necessity of dollars and cents. There is some excuse for this. There is an ideal and a real condition

We must have money. While a man does not live on bread alone, yet a certain amount of bread is necessary. The commercial spirit can largely be got rid of by our teachers. If more attention was paid to the choice of teachers, a very great deal might be done in regard to raising the standard of our profession. I had a long conversation with Dr. Patterson along this line, and he deplored the fact that many of the men in our schools are of such a character that the students are not profited by coming in contact with them. Knowledge is the power of continuity of thought, and if we want educated dentists they must come in contact with educated men, men who will teach them not only how to make money, but also how to be citizens, to be broad. And if we can do anything in this Institute to further that cause, we shall have attained the end for which we meet.

Dr. M. C. Marshall,
St. Louis, Mo.

I was struck with the idea that the dental teachers having thrashed out the length of the term, should take hold of the preliminary end of the problem. I think it is a good thing, and I commend the paper, with one exception. We all know that there is no state or school, east, west, north or south, where the dean is more likely to see double than in Louisville, and I warrant you, gentlemen, that you will see double, if you are not careful, before you get out of here. Because

Blue grass waves the bluest
in Kentucky.
Blue bloods are the fewest
in Kentucky.
Moonshine is the clearest,
But by no means the dearest ;
Yet it acts the queerest,
in Kentucky.

Dr. W. E. Grant,
Louisville, Ky.

It seems to me that there is quite a difference of opinion among the members of this body as to what our real object for existence is, and what properly should come before the meeting. When voting for the change of name of this association it was my understanding that I was doing so in order to give us a broader scope, and in the discussions at that time it was emphasized that we would have to settle this question of preliminary education; not in a legislative way, but as teachers gathered together in council to say what we thought we ought to have and what we could reasonably expect to have, looking at the question broadly from the material matriculating in our schools. So that it seems to me our president did not make a mistake in bringing this question before us at this time, and that it is well for us to decide upon a preliminary standard. I do believe that we need, seriously, to consider this question of curriculum. We need a rearrangement of our curriculum. I know we have too much work to do in Louisville, and we want relief; therefore we ought to discuss this question now. As Dr. Thornton said, we must know first what we are going to teach, and then let us find out how best to teach it. I agree with the sentiment so beautifully expressed that we should occupy an exalted position before the professions and the laity at large; at the same time, there is a practical side to the question. The men who have a high school education, and those who have been fortunate enough to be in a position to obtain a degree, will never be satisfied to practice dentistry in the mountains of Kentucky, or Tennessee, or in Oklahoma, or Indian Territory and other such sections of the country. So there are places here for the element that we would like to discard. The people in these sections must have dental work done, and they want it, and we must be able to supply the men to do it. This opens up a phase of the subject that I shall not attempt to discuss at this time.

Dr. Edmund Noyes, Chicago.

I think it is very true that certain men will gravitate to the less desirable localities in our states, but tell me, gentlemen, is there any immediate likelihood that there will not be enough fellows going through our schools who are well suited for these localities without having any one special school to teach these men or without altering the entrance requirements of the whole body so as to have a few of them? The professions of law and medicine have not thought it worth while to consider such a matter as that. Can we as a profession say that we do not want higher preliminary education, that we can get along with a lower standard than is required of the boy who is to be a mechanical engineer or an electrician? Technical schools require a four years' course of the severest kind, some of them so severe that they weed out one-third of the freshman class every year, and they require a full high school course for entrance. Is it necessary or desirable that the dental profession hold itself out as not needing so high a standard to begin study as is needed for the professions I have mentioned? The man who goes through the Rose Polytechnic Institute or the Massachusetts School of Technology is a useful professional man. Do we have to put our standard lower than that? It has been intimated that we are in danger of sliding backward, and that we must get a stronger hold on the technical side of education. I do not for a moment desire that the technical training should be shortened or made less thorough than it is now. But, gentlemen, that is not where the danger lies. There is not the slightest danger than any dental school in the United States or Canada will minimize its technical teaching. Our students will not permit that. Three-fourths of our students are after the mechanical teaching. They do not want anything else that they can avoid taking, but they want the technical teaching and they will get it. They will not go to a school that does not give it. What we need is to crowd upon these ignorant, and because ignorant, unwilling, young men the theoretical teaching which is at the foundation of every one of our operations in the practice of dentistry. What we need is not men who can make better fillings, but men who have a sounder judgment; not men who can seal up a treatment in a root canal more tightly or more wisely, but men who know better what treatment to put in there. We must continually fight for the theoretical and scientific side of our teaching and of our professional life. The first case of a recent graduate in law will send him to his library to hunt up authorities and to study so as to make the most of his case. The same thing is true of the medical graduate, but it is true of the dentist only to a very limited extent. You are all aware that there are hundreds, even thousands, of dentists who go on week after week in their practice without thinking it necessary to consult an authority or to go to a text-book. If dentists do not acquire studious habits, and a knowledge of the sciences upon which dental practice is founded while in school, they will never do so, but if their mechanical training is inadequate they may rapidly overcome such deficiency by their practice at the chair and in the laboratory.

Dr. J. Q. Byram, Indianapolis.

While I believe that this body should not deal with legislative work, I also believe that as teachers we have the right to express our views on this subject in order that our deans may know our sentiments. There is one thought in the paper that has not been referred to, and that is with reference to the student with a degree. We hear so much said about encouraging educated men to enter the profession of dentistry. In my opinion we are discouraging these men from studying dentistry because we require them to spend the same amount of time in our colleges that we require of the boys with an ordinary education. Under such conditions we must expect that these men will enter fields which offer better inducements to educated men. This is a phase of the subject that we ought to consider carefully. Those of you who have been teaching a number of years will remember that when we gave time credits for medical and pharmaceutical degrees, the recipients of such credits were graduated as our strongest students from the time they entered until they left our schools they were kept busy. But let a college man, who is in the habit of studying, go along with the student with less education and do the same work and what is the result? He begins to idle away some of his time, and before long he gets out of the habit of studying. In nine cases out of ten he does not graduate as strong a student as he would have been had the work been crowded on him. I believe in working students hard from the time they enter until they leave college. We do not have too much work. There is not an institution in the country giving their students too much work. We do not drag the work along, but let us get the boys in and crowd them until they graduate.

Dr. J. D. Patterson, Kansas City, Mo.

Some three or four years ago this organization changed its name to the one it now bears, and we then discussed whether it was the function of this organization to confine itself entirely to technic teaching or educational methods. Dr. Cattell was snowed under then, as he will be again. You might as well shut out the sunlight as talk of divorcing actual technic methods from the questions of whom you teach, and what you teach. You cannot do it. In the discussion at that time it was believed, and I believe it is true now, that technic methods as discussed in an association of this kind, while new to every class entering the dental college, must reach a limit. When new methods come up, such as porcelain work, we have something to talk about. But that is different. We reach the ultimatum in technic and we must turn our minds to something else, naturally to the methods of teaching and the advising of legislation for better educational methods. There is no question in my mind about that. You cannot divorce the two. If this association continues its existence, we must stand as sponsors for the legislation which will be enacted by the Faculties' Association, and here is the place to discuss such matters.

Dr. Cattell, Nashville, Tenn.

I do not want to be misunderstood nor considered unreasonable. Many of the subjects mentioned to-day are fine and should be talked over. somewhere. We have other societies for that purpose—but the idea of this association is different. It is an institute. Do you know the meaning of that word? And the meaning of the word pedagogic? Study the name of our association a little and you will ascertain that these other matters do not pertain to this particular body. All institutions cannot do similar work. One does this kind of work and another some other kind of work, all help to boost up our profession. So we, as a single society cannot take up all kinds of work and expect to thrive. We have dwelt in harmony for many years. Why? Because we have let all things alone other than what belonged to us. Where are our young men? Those who are just beginning to teach? Why are they not with us? Because slowly we are drifting away from the original object of this society. We are not making teachers as we did a few years ago. We are not helping dental schools to better teachers. Where but here can these young men go to learn how to teach, and we are not encouraging them to be with us—because we are drifting away from the object of our institution.

Dr. D. R. Stubblefield, Nashville, Tenn. I regret that I did not have the pleasure of reading and digesting the address so that I might more logically utter the convictions I have on this subject. Indeed, when I think about the subject of preliminary requirements as leading up to the proper extension of education in the curriculum, I am in doubt as to what I really believe and think best. And, then, when I try to harmonize what I know to be the better principles of instruction and what I believe to be fair and legitimate for men who are subjecting themselves to professional training, I still feel that I do not know which side I am on. We have shown that we endorse our president's idea that our material should be brought up prepared for our hands. As a matter of fact, an untaught mind cannot grasp the question with the same degree of certainty that the trained mind can. I remember distinctly when, twenty-five years ago, I began to ascertain that old men were before me whose minds had not been trained in the primitive period of life. They seemed to understand, yet when you asked for results, one found that what he had said did not make an impression. Then I saw the age of the students diminish, and the younger men evinced signs of a better foundation. They understood what you said. As we have advanced in our discussions and in our progress and growth, we have announced that we must have better prepared material, but, as has been said, what actual credit does a man receive who comes to you thoroughly prepared? Does all this training really fit him for his work in dentistry? I believe it is absolutely farcical to give a man credit for work but not for time. You cannot tell me that an A.B. degree exempts him from all this work, and still does not diminish in any respect the length of time necessary for the pupilling. Why is it, as Dr. Bryam said, that the man with a degree gets to be a disturbing element in the class, and frequently does not turn out well. It is so, but not necessarily so, from the basis of fundamental facts. I believe that the ideal in the mind, the attitude of mind is at fault; that the man who is trained, who has prepared himself fundamentally, ought to have a proportional shortening of the length of the course, and then he must address himself to the actual work of professional training in order to get through in a shorter time with the practical work itself. Our president said that not only must the present requirements be advanced, but the present and future requirements must be rigidly enforced. I do not agree with him that we should advance these requirements. Length of time in school is not the measure of a man's training. Our colleges do not make men, they only prepare them to make themselves. And when the idea is lodged in a man's mind that when he gets a degree he is made, then he is unmade and never will be anything else. As to the curriculum: I do not agree that our second year is congested I have not taken the catalogues of the various colleges and examined them with reference to that, but I believe that the matter now contained in our curricula, as a whole, is sufficient. If Dr. Tileston feels that his second year is congested, and he must decide that for himself, if he will take his whole course and throw it together and then rearrange it, year by year, he will have a good curriculum. We need a rearrangement, a readjustment rather than an increase or diminution. I know we have always had more than an untrained student could thoroughly digest, yet I have never felt that there was a student who, if he did his duty, could not easily do all the work required of him. The man who conscientiously does his work will get a proper training from the curriculum as it stands to-day. The president should feel happy that he has suggested a subject which has aroused us to think. That is the measure of success of any presentation. The address that is received and bowed to, and not discussed, is, to my mind, still-born.

Dr. Tileston. I appreciate very much the discussion aroused by my paper. Of course, this is not a legislative body; nor do we propose to pass any legislation with reference to this or any other subject, but it is within the province of this organization to judge of the fitness of the student who receives instruction: to make very strong recommendations, if necessary, to the Faculties' Association who can legislate and give us what we desire. As to the congestion of the junior year: If a school includes in its curriculum the subjects recommended so strongly as almost to have been made obligatory, I do not see how it is possible that the junior year is not congested. Sarcely a subject in the freshman year but must be carried over to the junior year; and many studies are commenced there that are carried over to the senior year. So that the junior year is a combination of the two and there is bound to be more or less congestion. I have observed the same condition in other schools as well as in my own. It might be well to take out the subjects that are not absolutely essential, for example, physics. It takes three years to teach physics properly in a scientific school, yet we teach it only a part of one year and expect to achieve the same results. The same is true of electricity. Dr. Black presented a paper on this subject in Chicago and confessed that it was almost hopeless to attempt to teach physics in a dental school. The equipment and the knowledge required of the teacher are too great. By combining some subjects, as physics, electricity and metallurgy, we can give all that is essential without taking up more of the student's time than is absolutely necessary. Dr. Thornton quoted me as saying that we required the student to *do* things and not to know anything. I did not say that, but said not only was it the duty of the school to teach the student to *know*, but also to *do*. He must *know* why, as well as know how, to do. He also spoke of grades of culture. All lawyers are not judges, neither are all dentists capable of taking high positions. If we take our applicants only from those who are, by culture and education, capable to assume positions in dentistry analogous to that of a judge in law, about thirty-five or forty of our schools will cease to exist for lack of students. There is no reason why the citizens of this country should not obtain such education as they can get free. Let them go and take it. If they do not take it, then let us refuse to accept them as students in our colleges, but beyond that it is not reasonable for us to go.

"Museum."

By D. M. Cattell, D.D.S., Nashville Tenn.

All schools, colleges and universities should have a museum as a part of its armamentarium.

We have our lecture courses, reading courses, quiz classes, demonstrations and clinics. In our lectures reference is made to anatomical, physiological and pathological conditions. We also talk about the normal and the abnormal forms of development. We tell of ideals and modified types. We teach the *general rule* of things and of the departure therefrom. Anomalies we find in multitude. What we can *see* and *feel* makes a deeper and more lasting impression on our minds than the mere *hearsay* or reading about. The ideal teaching to-day is by object exhibit rather than didactic presentation.

We have public museums that cover a great variety of subjects—great places for study, but usually at inconvenient places for students to reach. The special things they should examine are so mixed with other objects that they fail to specialize what is necessary in the mind. So it is needful that each school should have its own storehouse of object lessons. It is no uncommon thing for high schools, or even so-called "grammar schools" to have a more or less equipped museum covering somewhat the field of geology, botany, minerals, fossils, comparative anatomy, etc. So much more should the professional schools dealing with science, art, mechanism, animal life in both its physiological and pathological conditions. It's true that nearly every dental school has a room, somewhere within its college walls, called "The Museum." Let us not look too closely at the few anthropological specimens of the many poorly constructed "deposit pieces" left by graduates as proofs of their fitness to follow the life of a dental surgeon.

This museum room should occupy a position convenient to both teacher and student, especially the former. When a subject is presented to a class, the teacher should have spread out on a table before him such exhibits apropo of the subject that he may show proofs of the ideas presented. Many of these exhibits are of a size and nature that the whole class can see clearly the object by holding it up and turning it around so that all sides may come in view before them. Others are so small that it is necessary to pass the exhibit from student to student. Other specimens again are too delicate to allow of general handling, and must remain in position while the students file by, taking a glance and giving away for others. Afterwards the exhibit should be replaced in the museum, where those wishing a longer and closer view can, at their leisure, pursue the study further. So many little things are spoken of before the class, which if not exhibited, the student fails to retain memory of. Each professor should have a tray, say some twenty by thirty inches square and two inches in depth, always at his command, so that if needed the exhibit can be taken from the museum and carried before the class in a neat and comfortable manner—one that will impress the students of its value and importance. My idea is that we would *teach more* if we *lectured less* and if we *exhibited* more we need to *talk* the less. We all understand the difference between hearing a cold paper read and witnessing a hot demonstration as a method of learning. Why not apply the same principle to all teaching possible. It is a poorly equipped school that has little else than words to carry before the class for their edification. The day of the *orator* as a lecturer in class work is past. The real teacher has come with *things to see and things to do.*

The things a museum should contain as a part of the equipment of a dental school are varied and yet fairly well defined.

The chair of operative dentistry should have at its disposal a number of wooden or papier-mache teeth enlarged, some twenty or thirty diameters, containing properly prepared cavities for filling belonging to the different classes of cavity beginnings, showing outlines, retention and convenience forms, walls, line and point angles. Also, many extracted teeth, showing the beginnings of decay belonging to each class as well as the final result exhibiting the enlarged cavity. Many charts, placards and maps expressing more to the student than words. Also, rules of procedure or classification of conditions may be printed in large type on linen sheets and placed before students that correct copy may be made in their note-books.

The time is not far distant when the professor of this chair should have at his command a gnathodynamometer, a phagodynamometer, a manudynamometer and a tupto-dynamometer. Also a micrometer. All these should be in the repository of scientific mechanism.

In the field of prosthesis, enlarged papier-mache jaws with removable teeth; enlarged models of the different classes of crowns and bridges in different stages of construction. Plates made of the different materials used in practice; models of all things possible students are expected to construct in the laboratory.

In oral surgery dried specimens of the cadaver, showing oral surgery operations; skulls showing deformed palates, etc. Many ingenious things are used to help the student in understanding the art of surgery.

Orthodontia, too, comes in for its share of models and casts, representing difficulties to be overcome and appliances used in the performance thereof, crania touching on the etiology of irregularities.

Materia medica should have a corner with bottles or vessels containing samples of all the drugs taught before the class, and in therapeutics specimens of each medicine used or advised should be in shape to present before the class.

The chairs of histology, bacteriology and pathology should be well supplied with microscopic slides representing the conditions studied. Also a good equipment of slides for stereoptican views.

The chair of anatomy should be richly supplied with charts, bones and manikins, both the paper and dried cadaver.

Teachers of chemistry and physics require a multitude of apparatus to properly set before students an intelligent idea of chemical combinations, solutions, solvents, reagents, etc.

In the chair of comparative anatomy we find it impossible to carry on a proper course without many specimens of animal skeletons, especially the heads and jaws. Charts, too, play an important part in the proper equipment.

Probably the most prolific field of all, numerically, covering specimens of interest to the dental student are those more properly belonging to the chair of dental anatomy. The teacher in this field of work should have an unlimited supply of good typical forms of all the human teeth. There should be a set of light wooden or papier-mache teeth enlarged at least fifteen diameters. These should be ideal in form. Then skulls, showing proper alignment of the teeth, both deciduous and permanent. Also proper occlusion, articulation, interproximal spaces and proximal contact. The broadest field for gathering curiosities belonging to the dental world is in the anomalies found in tooth formation. Here the varieties are so numerous as to be almost innumerable, yet they are readily classified. The trouble with the smaller specimens is the difficulty of so arranging them for class inspection and yet prevent too much handling. There are several ways more or less good. But the subject of preparation, classification and exhibition of curiosities in tooth formation is large enough and important enough for a special paper.

But, yet again, the greater bulk of museum specimens found in many of our dental schools consists of "deposit pieces" left with the school as a part of the requirement of the graduating formula. These have their place in a well-equipped museum, for many of them are surely "curious." They are always points of interest to the undergraduates as well as the alumni. The accumulation of these historic pieces and what to do with them is quite a question yet unsolved. The main point is to prevent their disappearing from the proper repository and re-entering again through macinations of a would-be graduate. There are many curiosities that look well and do well in a dental museum not mentioned here. The intention is only to hint at the direction one might follow in the collection of specimens valuable for teaching purposes. The character of the room housing the specimens, charts, maps, models and curios should come in another paper. But surely the proper grouping and arranging in reference to the light is important. The best forms of cases for the large pieces and the method of mounting the smaller ones so they can be easily seen and not injured in handling is a subject to be well studied. Not the least important, either, is the intelligent labeling of each piece—entitling the donor to remembrance. Much has been left out that might have properly had a place in this paper. Some things appearing herein may have better been left out. After we have discussed the ideas presented and suggested new ones, I will then know that my "hind-sight" is far better than my "fore-sight."

Discussion.

Dr. Ellison Hillyer, New York City.

I can heartily agree with all Dr. Cattell has said. In one point we in New York would be unable to follow his suggestions, and that is in centralizing the museum in one place. It would be impossible for us to do that at this time, and even were it possible, I doubt that we would desire it. It would necessitate the erection of a special museum building. I am told by Prof. Misse that this is done in the University of Aberdeen, where all the departments have a connection with a central museum, each professor occupying a wing and having his specimens in this particular place. We prefer to have a *working museum*, one that will comprise the specimens used in all the classes, and yet spread over all departments. They are in such condition that they may be taken from one department to the other. The greater part of them are near the main amphitheatre. Our aim is to make each section and practical class complete in itself, and within another year I hope to see every class with a full set of specimens of every kind; every required prosthetic piece and every operation in cavity preparation, etc., shown in steps. This step system we illustrated at length in the exhibit of last year, where I showed many specimens. By this method the student may turn to a case and compare his working models with typical models he sees in the order of progress. But for us it would be inexpedient to have a central repository, much as we might desire to do it for sentimental reasons. The *working plan*, scattered throughout the college, where students come in contact constantly, is desirable.

Dr. W. G. Foster, Baltimore, Md. We take considerable pride in our museum. We have a large room set aside for that purpose. Many charts are kept there, and others in the lecture rooms, hanging on the walls, so that the lecturer may refer to them. A janitor is always in attendance on the lecturer so that if any particular specimen is wanted, he can get it from the museum. We also have a curator who spends two days of each week in the museum, from 2 to 4.30 p.m. We have a very valuable collection of paintings and specimens of various kinds. On these two days the student can have anything he desires explained to him by the curator. If the student wishes to take advantage of the library at other times, than on these two days, we issue a permit to him, which he carries to the janitor, who allows him to go into the room. If anything is displaced or broken, the student is held responsible. In this way he can spend an afternoon with specimens which he could not have otherwise. We find our museum a great benefit. Many students avail themselves of it.

Dr. A. W. Thornton, Chatham, Can. I think we all enjoyed Dr. Cattell's paper. Most of us are willing to admit that the fingers and eyes are important for receiving instruction not second to the ears. It seems to me that one of the mistakes made in appointing teachers is that we appoint men who can do and who cannot teach. If I had my choice I would rather have a man who is a good teacher and whose abilities to do are only of a mediocre nature, than an expert operator with little ability to teach. If the teaching of the future is to be done by seeing and handling, better work will be done. We want as teachers men who can do; men who can interest their classes, and they will develop into beautiful workers.

Dr. J. H. Kennerley, St. Louis, Mo. I have been very much impressed with the remarks of the previous speakers, but more particularly by those of the essayist. If Dr. Cattell had entitled his paper "The Value of the Museum" I think the gentlemen present would have had many more good thoughts on the subject than they have now. During a recent visit to Philadelphia I visited the museum of one of the colleges, and saw hanging on the wall the first dental diploma issued in the world; a matter of history that will endure as long as the world endures. That impressed me very much. It was issued to a man entering, at that time, a new profession. This diploma is a most valuable and interesting souvenir. And so we find many interesting things in the museums of different colleges. Many things that have apparently been forgotten, things that men of to-day write about are found in these museums having been worked out years before. I am the fortunate possessor not only of the first diploma issued by the institution I represent, but also the first piece of prosthetic dentistry turned in as a specimen piece by the first graduate of the institution. These little things are of great value to us in a historical way. Dr. Cattell, in his enumerations of the furnishings of a dental museum, makes his museum a little bit cumbersome. If the school is well equipped with lantern slides, it would be quite a little task to carry those slides from a central museum to the lecture room and back again. Those things had better be housed in the lecture room. And the same thing is true of the bacteriologic, histologic and pathologic slides we use in teaching. In connection with the anatomical department in our college we have a museum that dates back something over three-fourths of a century. It contains many valuable specimens, valuable both from a historical and a teaching standpoint. We also have a large collection of bones which are rented to the students. On the return of the specimens, all the money deposited by the student, except about fifty cents, is returned to him. Thus the student can have the bones of the body constantly before him while engaged in their study. The World's Fair has brought about the location of a huge museum in the city of St. Louis, and like other municipal museums, it will contain a large variety of things of interest to all, including the dental profession.

Dr. Burton Lee Thorpe,
St. Louis, Mo.

One thing Dr. Cattell did not mention, and which I believe to be a valuable adjunct to a museum, is a collection of photographs, not only of the founders of the institution but also of pioneers in dentistry the world over. I have several hundred photographs of the foremost pioneers in dentistry of Europe and America. If any of you desire to make use of these photographs, it will afford me great pleasure to let you make copies of them. To make these pictures doubly interesting, each school ought to have, as was discussed at Buffalo last year and recommended by Dr. Ambler, a series of lectures on the history of dentistry, illustrating them with lantern slides, showing pictures of these famous men, instruments invented by them. Likely not ten per cent. of the dentists in America to-day know only a smattering of the history of their profession. I once shewed a visitor at my house a photograph of Leonard Koecker, the pioneer of Philadelphia, who wrote the first text-book on the principles of dental surgery in 1822. My friend remarked: "Yes, I met him at the Columbian Congress." Photographic copies of old diplomas, newspapers, advertisements, etc., also add to the interest of the museum.

Dr. H. A. Smith, Cincinnati, O.

We ought to feel indebted to Dr. Cattell for presenting this interesting subject. I want to refer particularly to the opportunity that all colleges in our large cities have for taking their classes to the museums of natural history societies for the study of comparative dental anatomy. We find great advantages to our students from occasional visits with their teacher to an institution like this. The doctor referred to the specimens which may be taken before the class and passed around. Usally that is quite unsatisfactory, the students are not interested, and the specimens may be lost. Besides the time consumed while the specimens are being passed is quite an item. Dr. Cattell refers to didactic teaching and the object-lesson method. It seems to me that the recitation method in connection with didactic teaching will be found to be the most satisfactory. But, after all, everything depends upon the ability of the teacher, no matter what system is adopted.

Dr. S. H. Guilford, Philadelphia.

This question is one that has troubled many institutions. We want to give our students every possible facility, and yet we want to keep the museum intact and in perfect condition. Our museum is filled with anatomical and other specimens, all under lock and key. The students can inspect them but they do not have the privilege of examining them, unless they ask one of the professors or demonstrators to show them, and the request, I am sorry to say, is not often made. To have these specimens under lock and key is not very satisfactory because the students do not have the privilege of handling them at will. For my own part I select what I need to illustrate my lecture, and at its close I allow such students as wish to examine the specimens under my supervision. With regard to the matter of dental history, of having photographs of illustrious dentists in the museum, I think that is eminently desirable. A few years ago our college succeeded in securing the services of Dr. Charles MacManus, who gives illustrated lectures on this subject on two evenings in each year. Then, we have hanging on our walls the pictures of men who have been instrumental in building up the school. We have the deceased trustees and the first two deans, the third being still in office. The students of every institution should be made familiar with the characteristics of the teachers who have been there before their time. I think it tends to encourage emulation. I also like the idea that we saw exemplified in the University of Buffalo, where two bronze tablets are inserted in the walls of the institution, one to Dr. Southwick and another to Dr. Barrett. Where it can be done, that is a most desirable thing to do.

Dr. Cattell.

I thank you very kindly for the interest you have taken in my paper. One of the speakers said that some men could *do* well and not *teach* well, and that others could teach well and not *do* well. It made me think of my work in free-hand drawing. I took nineteen lessons, but after the nineteenth I could not do much more than I could at the first. And yet I can get out of students better work than I can do myself in drawing tooth surfaces. And so I believe it is with many teachers. A teacher is one thing, a mechanic another. I would suggest that photographs, pictures and bas reliefs belong rather to the library and not to the museum, and yet there may be an overlapping, so that it is difficult to say what should go into the museum and what into the library. Both rooms are important in every school and should be closely connected. When we mount specimens it is important to mount them so that the mounting will not interfere with the value of the specimen for teaching purposes. What use is made of such specimens depends entirely on the teacher. I do not believe that there is a school existing that has the number of specimens that each teacher would like to have, and yet some schools have very fine museums. One teacher will want one specimen and another will want an entirely different specimen of the same class. Some of you object to the idea of having a single room for a museum. My idea is to have a separate or adjoining room, to which each instructor must go when he enters the building, where he can leave his hat and coat, and then gather from the museum the things he requires for his lecture. After the lecture he must return the specimens to their respective places, so that some other teacher can make use of them the next hour or next day, presenting them from a different standpoint. In that way the specimens will have a place where everybody can find them when they are wanted. Later returning to the coat room or ''faculty room'' to wash hands, brush hair, chat with next hour man a moment before donning hat for the street. I like the idea of centralizing, because in that way the teachers will also have an opportunity of meeting with each other once in a while. I do not like the idea of men teaching in the same school and yet never meeting, simply because there is no place to meet. That does not work up college interest and enthusiasm. Therefore, a central room has more than one advantage.

"Recreation" in Dental College Education.

By J. D. Patterson, D.D.S., Kansas City, Mo.

Recreation is unquestionably demanded for the physical and mental well-being of men and women. Especially, however, for those in early life and those physically or mentally overworked. But, in our discussion to-day the purport is not to enter upon the broad question, but only the part of it that premises that recreation is needed by students in dental colleges and should be provided for them.

The subject is not of my own choosing. I am, and have been, interested in many departments of dental training, and upon one or two my friends say I am over-enthusiastic; but as to the subject of recreation for our students in dental colleges I have scarcely given it a thought and now it does not greatly appeal to me; for I have usually thought they had too much of recreation or, at least, the opportunity for it. I presume your Executive Committee in assigning to me the subject, had in mind the idea of a hard-worked dental student whose intolerable grind was sapping his physical and mental equilibrium, and that in this emergency it was the duty of the officers and the faculty of the college to devise and furnish methods to alleviate the dire difficulty. In some instances this has resulted in well-meant efforts to correct a supposed evil, and gymnasiums have been provided for physical exercise. The football clubs have been formed, smoking and billiards provided and other evidences are seen of efforts to supply the want evidently referred to by your committee.

An individual opinion upon a question is sometimes, I know, of very little account. A contrary opinion upon questions already satisfactorily settled receives, and should receive, no attention. But the question of "Recreation" in dental education is certainly an open one, and as it is new to the writer, our individual opinion, if fortified by good observation, is entitled at least to a hearing.

The writer has long known that something is very wrong with the average dental student; that there is an indifference, lassitude or indolence, which has worked against his advancement in the acquirement of skill and knowledge. If it is a lack of the necessary relaxation, then let us have the recreation, so that the objection may be removed. If his technical manipulation and technical study and repetition has seen to stupify his brain, then let us, for conscience sake, seek to remove the impediment if furnishing "recreation" will do it.

But, our observation has led us to believe that the all-prevailing nerveless condition of the dental class is consequent upon other and more serious problems, and which cannot be corrected by any "recreation" known in ancient or modern days.

I believe that our students are compelled to loiter and become lax because sufficient tasks are not given them, and apparently require "recreation," simply because so little is required of them. Instead of "recreation," what is demanded is that more to do should be given them and that double the number of teachers should superintend their work. From time immemorial it has been proved that *change is the best recreation*, and the change from one to another of the very varied operations and technic necessary to equip the students for practice, and a change in his demonstrators, furnishes the *best* of "recreation."

Careful observation convinces that the dental student works little more than three or four hours per day. Many of them not so long, and this includes attendance upon lectures as well as infirmary and technic work.

The dental student is past the period of adolescence; when he comes to the college his "play spells" need not be so regular as when his brain, nerve and muscle was in rapid formative growth, and an equilibrium could not be maintained without recreation and rest which permitted relaxation. The dental student is not an unformed animal whose easy tasks are of necessity irksome. What he should have, what he should be *compelled* to do is at least eight hours of pretty continuous work. His days of adolescence are over—his preliminary qualifications are accomplished. He is entering upon a professional study which has peculiar demands on account of the knowledge asked, of the nicety demanded of the directing brain and eye, and of the obedient hand, requiring the trained touch only found by constant and painstaking repetition extending over many hours and many days. This ability *is not* brought to the possible perfection in the months of the dental course as now covered; and the doubling of working hours, and the repetition of that work under twice the number of demonstrators is the only method known to the writer which will produce what we should and do desire.

This is the "recreation" which will bring the product we should and do desire. *This* is the recreation which, in my opinion, is most demanded, and not the gymnastic! This is what is needed by students to fill in the hours devoted to loitering which produces *ennui* just on account of the lack of a sufficient number of tasks and teachers. Double their number and repeat and change the drill and work, that alone brings dexterity, and the cry for "recreation" will not be heard.

No student ever was—nor ever will be—injured by such a system if there is the smallest latent desire to become adept and reach success in dental practice in later life.

This is the key-note of this essay, and it adds to the line of argument given by the writer one year ago during the meeting of this Association at Buffalo, N.Y., viz.: That no possible movement would so rapidly show advancement and be so productive of good as the increase in tuition fees in dental colleges, so that betterment and additions to the staff of demonstrators would be rendered possible.

At the 1905 meeting of the National Association of Dental Faculties the resolution providing for an increase of fees in dental colleges of this Association to one hundred and fifty dollars a term comes up for passage. VOTE FOR IT—WORK FOR IT—so that you can afford additional and better teachers and give to them a reasonable remuneration and thus do away with any possible clamor for "recreation," which ever is the plaint of those who have "nothing to do."

Discussion.

Dr. J. H. Kennerley, St. Louis, Mo.

I wish to congratulate the doctor on his paper. I believe that he is right in everything he said. It is the lazy man who needs recreation and not the man who has all the work he can do. I heard of a certain railroad president who needed some statistics in a hurry, and when his secretary asked him to whom he should assign the work, he said "Give it to the busiest man in the office." Such men do not need recreation. I believe the increase in fees will give us much better results. We will be able to employ more and better teachers so that we can keep our students busy all day long. There will be less cry for recreation. Two years ago our college established a students' club and furnished the members will all kinds of amusement. We served meals at a very low price; we had baths, pool and billiard tables and bowling alleys, for which they paid a very nominal fee. The man who wanted to work, and who was busy all the time, would go there and get his meals and be back at the infirmary on time. But the fellow who did not want to work spent all his time at the club. We could not abuse him because we furnished him with the means to be lazy. The club will now be abolished.

Dr. J. Q. Byram, Indianapolis.

I wish to compliment Dr. Patterson on his paper. It is not recreation that we need in our colleges, it is more work. As Dr. Kennerley says, it is the drone who needs recreation. We usually have two classes of students, one class that never does any work unless it is driven to it, and the other that does everything it can get to do. In examining our infirmary records we find that the men who are busiest in their infirmary work, are busiest in their technic, and they attend their lectures regularly. The men who are behind in their infirmary and technic work are absent from lectures and never have time to do anything. The trouble seems to be that they have too much recreation. I am about to try a little scheme with our class. My senior course is confined to porcelain work. I have announced to the class that if any cared to do special work after the holidays I would be glad to organize a class and give them the same course that is given to the post-graduates. To my surprise about sixty per cent. of the class reported to join this special class, and they are the busiest men of the class and not the idle ones. That leads me to believe that it is work and not recreation that they need. As to the advance in fees: At the Chicago meeting of this institute there was a symposium on the infirmary method of teaching, and after six or seven deans had discussed the subject, lamenting that they did not have good demonstrators, I suggested that if they paid the demonstrators more they could get better ones, and I am still of the opinion that increased fees will insure better teachers.

Dr. D. M. Cattell,
Nashville, Tenn.

Dr. Patterson gave us a good paper on recreation, but he wound it up in a very queer way. I must differ with some of the speakers. My experience has been that our best men need recreation. Dr. Kennerley's railroad clerk probably died gray-headed early in life. So it is with our students and practitioners. Those men who are always working and never playing die young; if they manage to hang onto life, they have poor health. I do not believe that we are justified in expecting the student who comes from the farm and has been in the habit of taking plenty of outdoor exercise and getting fresh air all the time, to keep right at work and advise him to stay in at night and never take any exercise. We do our students wrong by not looking after their health and seeing that they have proper recreation. I have in mind a boy who came to the South from the North. He was a lumberman, used to hard work. He had failed in his examinations the year before, and he came back determined to win. He neglected his exercise and he got thin, and pale, and bilious. I would go to his room at night and find him studying at all hours. He was so nervous that he could not sleep. I got at him, told him to go out and take exercise or he certainly would collapse. I would go out with him myself, taking long walks, and in a little while he was in good condition again. I have found certain forms of exercise exceedingly beneficial that the student can reach quickly and do in a few minutes and still work off an excess of feeling and not do himself any damage. I refer to the gloves. I know of no recreation that will do the student more good than a ''bout'' with the boxing gloves. It is manly sport; gentlemanly sport; full of good exercise and recreation of a character that does no one any harm. In a few minutes he is through and he goes back to his work with his mind clear, and he feels better; he is more active, more vital, and in fit condition to do his work as it should be done. We, as teachers, have the responsibility placed upon us of looking after the student's physical condition, and we have no right to allow the student to become overtaxed mentally and to be spoiled physically.

Dr. Edmund Noyes, Chicago.

This is a very interesting question whether we regard it as important or not. The most important aspect of it is some understanding as to what constitutes the duty of the dental school in respect to recreative opportunities for its students. We are coming to recognize more and more the responsibilities and duties of colleges of liberal arts, who have many students in residence, and who ought to assume some responsibility for the physical welfare of these men, not only in the way of providing gymnasia and opportunities for athletic sports and exercises, but in providing competent, efficient and authoritative supervision of the students in regard to the use of these matters. I am not prepared to say that the dental school either ought or can assume this duty. It should provide suitable opportunities for study and recreation within its walls so that students can avail themselves of them during the intervals between their regular duties. We do this by providing smoking rooms, which answer for the purpose of rest and the still more important one of acquaintance of the students among themselves. We also provide a library and reading room in which students may study. One thing in the paper surprised me a little (and I am not prepared to agree to it) namely, that most dental students can fulfill the requirements of dental school work in three or four hours a day. I do not believe that any student can graduate from our school if he works only four hours a day unless he is a phenomenon. If one could do so it would be easy to devote six or seven hours a day to outside employment. Some of our students do so, but I have observed that almost all of them are low in their classes and some have to take four or five years to get through the three years' course.

Dr. W. E. Willmott, Toronto, Can.

I believe that the dental student who can get his work completed in three or four hours a day needs no recreation. Our men are in college from six to eight hours every day, and in the evening they must go over the work they had during the day. The dental student, under such circumstances, needs exercise and recreation, and it is the duty of every college to provide such. There is no college that could not provide several pairs of gloves, as Dr. Cattell suggests, and few colleges have not a piece of ground on which they could erect a handball court. To my mind that is the very best exercise for the dental student. All the muscles are in play, and they go back to their work and do it better than if they are kept in college all day long.

Dr. Patterson.

Some of the gentlemen forgot that I started out with the proposition, "The benefits of recreation, especially for human beings in their adolescent life, and those who are overworked at any time in life is unquestioned." I followed, however, with the proposition that it was not the duty of the dental college to provide that recreation, and I had a counter proposition to make, and that was, that change of work is the best recreation; and that the dental student's work is not hard. The statement I made that the average dental student gets along with about half the work that should be required of him, I still think is the correct one. It seems to me that everywhere students can go where they can have proper recreation for a nominal fee, and do it even if they are worked twice as hard as they are now, but I do not think the college should provide it. Dr. Cattell and others inferred that I argued against recreation. I did nothing of the kind. That was farthest from my thoughts. But I do say that students do not have sufficient change of work, and repetition of work, which brings that digital skill they should have, under more and better paid demonstrators.

"Physiology."

By C. M. Wright, M.D., Cincinnati, O.

The teacher who approaches the subject of physiology from the standpoint of the experimental biologist has certain advantages over others, for he experiments with matter while it is alive. This the anatomist and the chemist cannot do.

Biology affords occular demonstrations of the intimate life histories of living creatures, which are made of apparently undifferentiated protoplasm. This illuminates function and emphasizes the character of vital phenomena pure and simple. As a teacher, the biologist can show to the student the phenomena exhibited by matter which is structureless, and yet characterized as living, and the student easily grasps the idea that just such properties must belong to the living parts of every tissue in a complex organism.

The teacher shows, under the microscope, the phenomenon of fundamental protoplasmic motion, and at the same time elaborates and explains modern theories about the property of contractibility in the specialized muscle cells. The later application of the laws of physics to physiological movements would be incomplete without this preliminary study of motion.

He shows in the same way the sense-quality of protoplasm, and explains his notions about the irritability of the neuron—also about chemotaxis, and the influence of thermal changes, and the varying effects of light upon simple living matter.

The student watches a minute creature when it feeds, and knows that a secretion has exuded from its body, for he sees the eroding effects of it on hard food substances enveloped by the soft jelly-like mass which forms the body of the creature. In this living picture he has an illustration of the source and power of the digestive juices of the most highly elaborated alimentary canal. The laboratory demonstrations of the actions of enzymes would not be as plain without this biological example. Absorbtion and assimilation are shown by the growth of the protoplasmic body itself. Waste can be detected by changes in the granular appearance of the creature during metabolism, and also by chemical analyses of the fluid in which it lives.

Multiplication, so important a study when the formation and growth of tissue is under consideration, and when the repair of tissue after injury, or the regeneration of worn-out tissue, is the subject of study, can be beautifully demonstrated in these simple creatures, for the student after watching certain karyokinetic phases, finds two creatures where only one existed before.

In the earlier editions of Michel Foster's text-book of physiology, the distinguished author introduces the ameba, and in the study of this creature lays the foundation of a profound knowledge of function in living cells. Function is the prime business of physiology. To find out what a tissue or organ can do, and how it does it, has been the pride of the physiological anatomist and the physiological chemist, from the beginning. Physiology must continue to be indebted to these patient and acute investigations. We know that physiology rests upon a tripod —biology, anatomy and chemistry. I am urging in this paper that attention to one of these supports, viz., biology, should precede the study of the others. The amoeba has for many years played an important part in human physiology and morphology. I remember well a conversation with Dr. Wm. H. Atkinson, twenty years ago, in which the morphology of this small creature was discussed. Very few microscopists agreed with Atkinson at that time about the differentiation in the structure of living matter. The Heitzman school in New York was the central home of some fine disciples from the dental profession of America, and Atkinson was a believer in Heitzman. I have not cared so much about the morphology as about the physiology of this tiny organism; and whether the reticulum is the source of phenomena or not, the functions inherent in living matter can be clearly shown in this simple microscopic friend of the biologist.

Landois, in the fore-word of his splendid tenth edition of a textbook of human physiology, says, "It has always appeared to me in my academic activity as a teacher that my principal aim must lie in the thorough preparation of physicians for physiological thought." Personally, I have felt that if the dentist, as well as the physician, could have what Landois calls "physiological thought," his whole attitude toward practice would be improved.

The nearest road to physiological thought is through biology. Persistent reflection upon the elemental properties of living simple creatures, makes the path clearer to a knowledge of the part played by the most obscure bit of protoplasm in the most hidden tissue of the highest animal.

Select, for example, a columnar cell in a uriniferous tubule, and recognizing its innate properties of motion, of irritability, of nutrition, of growth and of multiplication, the student can readily be made to appreciate how motion, growth and multiplication have been restrained, while its assimilative and excretive faculties have been enlarged and specialized by environment, and by some unknown directive influences.

Every cell in every tissue, of whatever class, epithelial, connective, muscle and nerve; and in whatever position, whether in gum, pulp, brain, or liver, presents to the student's mind a life history in accordance with his study of single-celled organisms.

The performance of its function means to him the nutritive activities necessary for the cell's life in the tissue, and the changing of its potential into some special form of actual energy.

With a familiar knowledge of living protoplasm, and a knowledge of the structure of tissues modern histology gives, the student forms complete mental pictures of the manifestations of healthy activity in every organ and part of man.

Then, with Virchow's celebrated saying that "*Omnis cellula e cellula*," the student is impressed with the deep significance of inheritance and succession, and that each cell is but a link in a chain reaching back hundreds of thousands of years. He acquires clear notions of evolutionary physiological and pathological *variations* in function and structure. He knows that every cell in every tissue of a complex organism like man, bears in its structure, the imprint of prehistoric experiences. And while he cannot trace the manifold irritations, and the infinite attractions and repulsions which make the ancestral history of each cell, and which has determined its present status in the tissues, he knows by induction that the past has moulded it. Every cell has a pedigree so ancient that the mind of man cannot clearly conceive of it. This has more than a speculative value to the student, for from this he learns to attach to the term *diathesis* a meaning so far-reaching that it seems like the sum of all past influences, emotions, conditions and environments.

He learns also to take diathesis into account practically, as an ever-present factor in every organism, whenever one tries to measure it physiologically or pathologically. The student is acquiring the "physiological thought."

When etiology makes plain the direct cause of an irritation which tends to destroy tissue and interfere with function, the physician, or surgeon, or dentist with the "physiological thought" takes inheritance into consideration and tries to weigh its influence on what Cohnheim has called "physiological resistance," and this in every tissue.

Metchnikoff maintains that the present structure of man, which is the result of untold ages of evolutionary cellular rearrangements, is not in harmony with present habits and environment; that organs built for defense and convenience, have ceased to be necessary for present needs, and have become sources of menace to the entire organism.

The large intestine, the vemiform appendix, the teeth and some other structures, are placed in this category.

This brilliant scientist also gives entertaining descriptions of the protective and defensive efforts of his Marcophags and Microphags, which to the physician with the physiological thought, suggest practical methods of surgical or medical therapeutics. Every hour at the chair, or at the bedside, or at the table in the surgical ward, the dentist, the physician and the surgeon faces *tissue injuries*, and if he has this physiological thought, he sees below the surface and behind the scenes. He sees the action of living protoplasm in its various forms struggling for its own life, and for the repair of tissue. He is the safe physician and operator.

There is just as much reason for the deeper study of physiology by the dentist as by the physician. The dentist deals with living tissue within living human beings. He applies mechanical, surgical and chemical measures for the prevention of disease, for the curing of disease and for the obliteration of the effects of disease. In other words, he is daily plunged into the very midst of pathological conditions which can only be correctly diagnosticated by the physiologist. Physiology then is the basis of the science of dentistry.

Discussion.

Dr. Adolpho Pfingst, Louisville, Ky.

It was a great pleasure to hear this paper, and I am sure we have all been benefited by it. I was curious to know just what phase of the subject Dr. Wright would discuss, because the subject of physiology is a large one, and it would be difficult to cover the ground in a few moments. He is correct in saying that the study of the cell is the key-note in physiology; if we teach from that basis, we can drill physiology into the student in the proper way. Dr. Cattell said that the teachers ought to come in closer contact with each other. I believe that if the men who are teaching clinical and technical work in dental colleges would remember that there are such subjects as physiology and histology, the physiologist could do more with his students. Physiology is based not only on biology and anatomy, but also on histology. Students are not interested in this work, and if the physiologist had the co-operation of some of the other professors he could get the interest of the student aroused in the subject. I believe in brevity, not only in a paper, but also in teaching. If we make the subject brief and clear, we can do more with the student than by going into detail. My idea of teaching physiology is to have everything revolve around the cell. I try to impress on the student that myriads of cells make up the body, and that difference in arrangement, in size and in function make the different structures of the body. And that these structures have to be fed. That they are living structures. That they give off waste. After the student realizes all this you can teach him other things which lead up to the feeding of the cell. The blood is the medium by which food is carried to the cell. I compare the heart to a pumping station and the blood vessels to supply and waste pipes. Then I touch upon the question of the source from which the blood gets its elements, which leads them up to "respiration" and "digestion." I go into the physiology of these tracts. The muscles move the entire body and aid in bringing food to the cell. The nervous system regulates all the body functions. Now, what should we take up with the dental student? They are interested as long as we stay on the head. The question is, How much shall we give these students? The idea I have worked out is to go over the whole body in a general way as briefly as possible without sacrificing clearness, and then to refer to some of the subjects which are of special interest to the dental man, such as development and histology of the teeth, mastication and insalivation and the relation of the nervous system in the performance of these functions. In that way I manage to keep them interested and to transmit to them all the physiology they need.

Dr. A. W. Thornton, Chatham, Can.

My mind reverts to the time when, as a student, I was studying physiology. The subject was not interesting to me. I heard much about cells and I was convinced that the man lecturing was the only one. I enjoyed the paper very much, and as I listened I was reminded of the definition given by Spencer of evolution. He defined it as "a change from indefinite, incoherent, heterogeneity to definite, coherent homogeneity, through various differentiations and irregulations." I read that pretty often before I got hold of it, and it was not until after I left college that I began to understand and believe that there was such a thing as a cell.

D. Geo. W. Cook, Chicago.

I want to compliment the essayist on his valuable contribution. I feel that, as a rule, dental students are poorly taught in the subject of physiology as well as in histology and anatomy, and yet these are the fundamental branches, and without a thorough knowledge of them it is impossible to understand pathologic conditions. That is one great obstacle in teaching pathology, that dental students are not taught properly in these fundamental branches. As Dr. Wright said, a knowledge of the cell and all its functions is the first essential in studying physiology, regardless of whether it becomes a multicellular or unicellular structure. If we can teach our students along the lines he has indicated, we will have a better class of students to take up the subject of pathology as well as operative dentistry. It was the thorough, scientific study that gave rise to the term extention for prevention. It was scientific study that gave rise to many of the terms used at present and that simplifies our teaching, and without study and scientific research on the functional process of the cell it is quite impossible to understand true advancement.

Dr. A. E. Webster, Toronto, Can.

I presume that this is intended to be a paper on teaching physiology. I would like to know what the psychologists would think of the method of teaching physiology as presented by those discussing. Do we learn things by the whole first, or by the parts first? I believe it is a fact that we see the whole of anything first. The child looks at the man as a whole; he does not know that the man has eyes or ears or a nose. He sees the whole object first, and later he learns all about the separate parts. Then, in teaching physiology, is it right that we should begin with the study of the cell and then study the body as a whole later on? Or should we begin with the study of the functions of the whole body, discussing it as the student knows it, and then gradually come down to the study of the cell? I was taught to begin with the cell, and I studied it faithfully, but I never knew the function of the cell until I knew the function of the human body. That is nicely illustrated in lectures by Dr. Black on bacteriology. Instead of beginning to teach the biologic characteristics of the organism, he first taught general physiology and then brought it down to micro-organisms. I thought that a sensible way of doing, and found it a great success in teaching bacteriology.

Dr. Fred C. Zapfee, Chicago.

I cannot do otherwise than commend Dr. Wright's paper. It is brief, concise and to the point. If all dental teachers were as impressed with the necessity for training the dental student in these subjects as is Dr. Wright, I am sure Dr. Cook would have no reason for complaining about the lack of knowledge, and his position is perfectly tenable. It is inherent with the dental student to dislike anything that savors of medicine. He comes by this dislike honestly, for it is inculcated into him by his preceptor, who, in most instances, is a man of the old school; one who has learned to extract and fill teeth and to make plates. He has no need for physiology, or histology, or general anatomy in his practice, and, therefore, he instills into the mind of his pupil the belief that these so-called "medical subjects" are there to fill in time, and all that is necessary is to pass them. These are not medical subjects. They are part and parcel of biology and belong as much to dentistry as they do to medicine. Although not a dentist myself, I can see where a knowledge of physiology and histology would be profitable to the practicing dentist. Furthermore, dentists are agreed that dental students have need for this learning; why, else, would they occupy a place in the curriculum. That being the case, it is essential that dental teachers impress their importance on the student, and co-operate with the teacher of these branches, usually a medical man, who is struggling along, doing the best he can, wishing he could do more; but the material to work on is not there. I hope the time will come soon when the dental student will be as eager to learn physiology and histology as he is operative and prosthetic dentistry. The thought may seem utopian, but if we are going to continue to include these subjects in our curricula, we ought to find some means for awaking the student to the fact that without a knowledge of their fundamental principles he will fall far short of being an accomplished dentist, a learned man in dentistry. Therefore, dentists, heed the cry of the medical man teaching in a dental college. Come to our aid!

Dr. H. E. Friesell,
Pittsburg, Pa.

The only way to hold the attention of the dental student in teaching these subjects is to awaken his interest, and the only way to do that is to show him how these subjects will be of practical value to him. How histology, especially dental histology, can be taught in any but an interesting manner, I cannot understand. For the teaching of many of these subjects we have had to rely on medical men. The medical man has the medical side of the subject, but he cannot appreciate the dental side unless he has practised dentistry. I do not believe that it is possible for the average medical man to teach histology, particularly dental histology, in a way that will interest or be of most value to the dental student. In our school, in the past, a medical man gave a course of twelve lectures in general histology; a full year was devoted to dental histology, taught by a dentist. Now the dentist teaches all the histology from the dental standpoint. The reason Dr. Zapffe and Dr. Cook find the conditions they mention is that the older dental lecturers do not show any interest in histology; they do not know anything about it. Until Dr. Black and Dr. F. B. Noyes placed the subject before the dental profession from the practical side of dentistry, we knew practically nothing about dental histology. Go into your local societies and speak of the histology of the teeth and surrounding structures and see if it is not true that nineteen out of twenty men, even though they may be good practitioners, know practically nothing about the subject of dental histology. I do not believe that a medical man can teach that subject, and the proper thing to do is to educate dental men in histology so that dentists can teach histology to dental students.

Dr. G. W. Cook, Chicago. Dr. Webster spoke of Dr. Black's method of teaching. That is exactly what Dr. Wright meant in his paper, and it is also what I mean, teaching the physiologic development of the cell. Dr. Black made his culture media and discussed cell physiology before he showed the student the morphologic structure, and that is exactly what Dr. Wright meant when he discussed cell physiology. Of course we are not discussing histology, but I tell you that Dr. Zapffe makes some beautiful clay models in that line, in which he is an artist. The thing we want is to study the cell from its functional standpoint. It does not matter whether it is a large one, a round one, or an oblong one; we must understand its function, and it is the same for all. That is what Dr Black teaches and that is what we all try to teach. The making of a histologist in the dental profession resolves itself into this, that there is not enough remuneration in it. The work takes a great amount of time, and hence it is given to someone who has not much to do and wants to do it for a few years, at least, until they get a practice; or a medical man does the best he can with it. Dr. Noyes has to this extent discontinued some of his work because he must live, and a man cannot be a histologist and make a living in the practice of dentistry too.

Dr. J. D. Patterson, Kansas City, Mo. I have been listening to this discussion with a great deal of interest. I teach pathology, and I have been waiting for suggestions as to how to interest the students. In my first lectures I try to arouse the pride of the students. I tell them what a great thing it is to be a skilled workman in gold, bridge work, porcelain work and prosthesis, but how much greater it is to be able to understand the normal physiology of the body; to understand what keeps it in that poise; to understand what leads to a departure from that, thus leading to pathologic conditions. I try to make them feel that they want to be something more than routine mechanicians. I know that I have done a great deal of good in that way, and I throw this out as a suggestion to others engaged in teaching subjects of that kind.

Dr. Wright. I thank the gentlemen for the way they have received my paper and for the many suggestions that I can take home with me. The first year at our college the boys are taught histology. When they become juniors we talk to them about physiology; and when they are seniors we talk to them about physiology gone wrong or pathology. And these subjects are not taught as special physiology, special histology or special pathology; they are general. I give as much attention to the liver cell as to the tooth cell; as much to the cell in the uriniferous tubule as to the cell in the dentinal tubule. But to interest these students and to keep them in touch with the subject, I am constantly using dental histology and physiology and pathology as *illustrations.* I cannot agree for once with Dr. Webster and the psychologists to whom he has referred, about the method of teaching physiology. Teaching is an art older than psychology, an art from which the psychologists may obtain points and facts upon which to build his theories. The synthetic method of teaching physiology, or from the action of the individual cell to the action of a congregation of cells, seems to me far better for the average student than the analytical method. The general functions are known to the student, and the teacher shows how they are performed by the action of the individual cell within each organ. I have had many fine thoughts from Dr. Webster which I have used after I have gone home to my classes, but in this I cannot agree with him. I want to teach these students just what is taking place in the body, so that they will know something about the action of living matter, or protoplasm, or bioplasm wherever it may be found. Physiologic biology is not keeping up with other biologic studies. We are not as far advanced as the bacteriologist. Therefore, it seems to me that we teachers should give this matter more attention.

How Should Ethics and Jurisprudence be Taught?

By Edmund Noyes, D.D.S.; Chicago, Ill.

Thirty-five schools belonging to the Association of Dental College Faculties announce lectures on dental jurisprudence. Eight of these also give lectures on ethics, and two upon "Principles of General Practice," which may or may not include the subject of ethics. Those which announce the teaching of ethics are the Dental Department of the Milwaukee Medical College, a professorship of "Oral Hygiene, Dental History and Ethics," (G. R. Wenkler, D.D.S.).

The Colorado College of Dental Surgery, which has separate chairs of dental ethics and jurisprudence (W. H. Hall, D.D.S., ethics).

The University of Southern California, dental department; a chair of ethics, literature and hygiene, (J. D. Moody, D.D.S.).

Northern Pacific Dental College, Portland, Oregon; a chair of dental jurisprudence and ethics, (James R. Cardwell).

The Kansas City Dental College; separate chairs of dental jurisprudence and ethics, (C. B. Hewett, D.D.S.).

The Vanderbilt University Dental Department; a lectureship on dental jurisprudence and ethics, (W. C. Gillespie, D.D.S.).

The Louisville College of Dental Surgery; a professorship of practice, ethics and history, (Max M. Eble, D.D.S.).

The Northwestern University Dental School; a chair of dental ethics and jurisprudence.

Seventeen schools do not announce any formal teaching of ethics or jurisprudence. These are:—Harvard University Dental School, Tufts College Dental School, New York College of Dentistry, University of Pennsylvania Department of Dentistry, Pennsylvania College of Dental Surgery, Medico Chirurgical College Dental Department, Baltimore Medical College Dental Department, University of Maryland Dental Department, Columbian University Department of Dentistry, Ohio College of Dental Surgery, Detroit College of Medicine Department of Dental Surgery, University of Michigan College of Dental Surgery, Chicago College of Dental Surgery, Meharry Dental College, Atlanta Dental College, Southern Dental College.

From this showing, especially as regards the subject of ethics, it would appear to be rather more appropriate for me to come here asking how it should be taught than trying to answer that question, for almost all of our schools must believe that ethics can be sufficiently taught by other methods than by formal lectures. While I am quite ready to acknowledge that "actions speak louder than words" and character and conduct are more influential than preaching, and it is therefore of the utmost importance that everything in the conduct of a dental school and every one of its instructors should conform to the highest standards of morality, I hope to make it appear that formal instruction in the special duties and relations of professional men, particularly the different standards of duty appropriate to business men and professional men is very important also. I can best accomplish this and the general answer to the question "How should ethics and jurisprudence be taught?" by giving you, more briefly that I could wish, but as fully as the time at my command will permit, an account of the course of lectures I have been giving for some years past in the Northwestern University Dental School.

It is a half course, one lecture each week, ending with the first semester, usually eleven or twelve lectures. Three or four lectures are given to the general subject of ethics. (The first lecture is an informal talk, not all of the class being in attendance the first week.) Three or four to professional ethics and the dental and medical codes, and the remainder of the course to dental jurisprudence, and the dental laws, especially that of our own state. The only text-book or authority in dental jurisprudence that I know of is Rehfuss. Our faculty have not thought it necessary to require students to buy it. There is no work on ethics well enough suited to my purpose to be used as a text-book, and there is nothing that I am aware of in the literature of dentistry on professional ethics except the code, and the papers that have appeared from time to time in the journals. I have therefore prepared a brief syllabus of my lectures which I have had printed and have required the students to purchase, as well as the dental and medical codes of ethics. I procured sufficient copies of the "Principles of Medical Ethics," published by the American Medical Association, and have had the dental code printed on pages the same size, with the edges gummed so that it can be pasted inside the cover of the medical ethics and have both codes conveniently in one pamphlet. The students have been required to purchase these and have been told to prepare to answer in their final examination any questions upon either code.

To present the general subject of ethics in three lectures seems almost ludicrous and is, of course, very unsatisfactory, but there is some reason to suppose that most of our students have never thought of the subject of morality in any theoretical or philosophical way, and I have believed it worth while to discuss briefly its fundamental problem, the end or object of life, the highest or ultimate good, and a few of the more important virtues and duties by which that end is to be realized. I have used this statement, "The welfare of an individual, as well as of society, consists in the perfect development and exercise of life." Pleasure is the normal and usual accompaniment and reward of harmonious and perfect development and right activity of body or mind. In other words, the ideal of good has two elements, worth of welfare, and happiness. The discussion is from the general standpoint of evolution, suggesting that the ideal of good rises to higher levels with the enlargement or development of life and activity both in the individual and the race, suggesting also that the fact or possibility of evolution necessarily carries with it the possibility of degeneracy, the sad results of which are too apparent in human lives to be overlooked or mistaken. Later on the suggestion is made that this teleological or scientific statement corresponds closely to the theological one, "The chief end of man is to gorify God and to enjoy Him forever," for man glorifies God and enjoys God in proportion to the harmonious perfection of his development and the right exercise of his powers. The obvious fact that welfare cannot possibly be accomplished by each individual for himself alone, but requires co-operation and service by each for the good of others illustrates the scientific truth that evolution has not resulted solely from an individual struggle for existence and the "survival of the fittest" as some have seemed to suppose, but the "struggle for the lives of others" begins very low down in the scale of conscious life and runs parallel with the struggle for individual life through the whole ascending scale of development, the highest expression of both being found in the New Testament summary of the second table of the Decalogue, "Thou shalt love thy neighbor as thyself," which thus appears to be as strictly scientific as it is Christian. It seems reasonable to hope and expect that the laws and processes of moral and social evolution may gradually become understood by men so that human intelligence may co-operate with natural laws, in other words, that men may be found at last working together with God and so the process of development in human life and society be greatly hastened. Very much in this department of ethics is wholly untouched. Paulsen has chapters on "Teleological and formalistic conceptions of good and bad," "The evil, the bad, and theodicy," "Duty and conscience," "Egoism and altruism," "Virtue and happiness," "The relation of morality to religion" and "The freedom of will." Paulsen's definition of freedom of will is so sensible that I quote it. "The freedom of man means the control of the spirit, the slavery of man means the rule of animal desires.' ' "Freedom of will means the faculty to determine one's life independently of sensuous impulses and inclinations, by reason and conscience, according to purposes and laws; and that man has such a faculty, that this really constitutes the very essence of man, no one has ever doubted." This I have followed by some illustrations of the proposition that freedom is conditioned upon obedience to law and that transgressions of laws, either physical, moral or spiritual, diminishes freedom and tends to bring man into bondage.

Ethics has a double function; to discover the right object of life, and to point out the way of realizing it. The latter part is comprised in the doctrines of duties and of virtues, which are different modes of presenting the same subject matter. The former gives a system of rules or laws to guide right conduct, the doctrine of virtues describes the system of powers by which this end is realized. Virtues are defined as "Habits of the will and modes of conduct which tend to promote the welfare of individual and social life." They are founded on natural impulses, which are fashioned into virtues by the reason, first, during childhood, by the reason of others, which should result in *habits* of virtue. Vices are abnormally developed natural impulses, not properly controlled by the will, for vice always indicates a lack of will power or the enslavement of the will. Virtues and duties are classified in two groups, individualistic virtues and duties, the fundamental form of which is self-control, and social virtures and duties, the fundamental form of which is benevolence. Self-control is very briefly discussed with reference to temperance, courage (independence, perseverance, patience) and calmness or equanimity. As respects the bodily life, in impulses or desire for nourishment, clothing, houses, play and work. As respects the economic life, the following of some useful calling, avoidance of avarice or prodigality, etc. As respects spiritual life and culture, the knowledge of truth and the comprehension and enjoyment of the beautiful, and honor and the love of honor. Social virtues, founded on sympathy, compassion and benevolence are justice, the passive form of benevolence, and love of neighbor, its active form, and veracity. The latter is perhaps equally an individual and social virtue. In fact, all virtues have both personal and social value.

The Bodily Life.

"The function of the body is to serve as the organ and symbol of the soul." "Everybody agrees that the body ought to be the servant of the soul. A good servant is one who accomplishes and endures much and demands little." "The rule of duty: Educate the body so that it may appear in this visible world as the pleasing expression of the invisible beauty of the soul."

The economic life and the institutions of labor and property which are its foundation, furnish occasion to say something about useful and injurious employments and the distinction between legitimate business and speculation and gambling.

After all these matters have been considered, even in the briefest manner, but little of the allotted time remains in which to say something of spiritual life and culture, which means, for the individual, the development of the intellect that he may know the truth, and of the senses and imagination that he may comprehend and enjoy the beautiful. Knowledge has a double function, to increase our practical efficiency in the particular calling or employment in which we are engaged, and our theoretical insight into the nature of things in general, in other words, understanding the world from our position in life. Knowledge which an individual cannot utilize in either of these ways is useless or worse. To know too much for his capacity makes a man, not wiser, but more stupid. (Ignorance is lack of knowledge, stupidity is lack of judgment.)

Professional Ethics.

There is a great abundance of materials, an embarrassment of riches, out of which to prepare the lectures on general ethics, but the reverse is true of professional ethics. The writings I have been able to find are not great in amount, and are very unsatisfactory. I have therefore been obliged to evolve more of it from "my inner consciousness," and I will welcome, from any of you, suggestions or information that may enable me to strengthen or enlarge the presentation of it. The interests intrusted to professional men are more important and the consequences of incompetence, carelessness, or dishonesty more injurious, than is usually the case in most other employments. It is proper, therefore, that the community should expect, and the professions should seek to maintain in their ranks, a higher standard of fitness and training, a better education, greater general intelligence, and above all a higher standard of moral excellence and more scrupulous conscientiousness than is expected or exacted from other classes. Two or three important differences between the professions and other employments constitute the reason for this higher standard of morality. In business people are expected to meet on terms of practical equality, each comprehending the transaction from his standpoint and able and responsible to protect his own interests. Of course this is not always exactly true, and in business a man does not cease to be "his brother's keeper." The fundamental idea of all legitimate business is that the ordinary transactions are expected to result in benefit to all the parties interested, but beyond this general rightness it is not often possible for the business man to go, and it is customary and necessary to leave each party to business transactions free to judge for himself if the transactions are likely to benefit him. On the contrary, the professional man and his patient or client do not meet on equal terms, but it is distinctly understood that very important interests and welfare are confided to the professional man, the party being comparatively helpless and unable to judge if the measures adopted are such as will best serve his needs. The duty of a professional man is therefore of the nature of a *trust* committed to him by his patrons, who are dependent for the proper fulfillment of it upon his personal honor and faithfulness as well as his knowledge and skill. It is always needful for the professional man to consider carefully and primarily his patient's or client's interests as well as his own. It is true that a profession is also a business, the word business having a larger application than profession. Every profession is a business, but many kinds of business are not professions. Thus we have a professional business, a mercantile business, a publishing business, a manufacturing business, etc. The business transaction of a professional man is the exchange of some definite service or skill for some definite sum of money, but this business ought always to be subjected to the restraints and limitations imposed by his professional character and professional duty. In most business transactions the matters of chief consequence are the *things* or *commodities* bought and sold, and personal services of buyer or seller are not usually a *very* important element of the transaction. We care more to buy the thing we want than to buy it of some particular salesman, and more to get the right price than to sell to any particular person, the personal services of the salesman being of less consequence than the amount and quality of the things sold. In the professions, however (at least those under our present consideration), the chief importance attaches to the personal services rendered on the one hand and some personal need, whatever it may be, on the other hand.

We may now, with the help of the Century Dictionary, attempt a definition of the word *profession*. I have been somewhat surprised at the vagueness or indefiteness of some or the attempted definitions in essays and journal articles upon professional ethics. For instance, Dr. Safford G. Perry, of New York, in an elaborate essay read before one of the societies, asked the question, "What is a profession?" and gave this answer, "It is an aggregation of men who have received a special training to do special work; nothing more and nothing less." It will be perceived at once that this definition would make professional people of almost the entire population who earn their livelihood, the only exceptions being what we call unskilled labor. The definition of the Century Dictionary seems to me a very satisfactory one. "The calling or occupation which one professes to understand or follow; vocation; specifically, a vocation in which a professed knowledge of some department of science or learning is used by its practical application to affairs of others, either in advising, guiding or teaching them, or in serving their interests or welfare in the practice of an art founded on it. Formerly theology, law and medicine were specifically known as *the professions;* but, as the applications of science and learning are extended to other departments of affairs, other vocations also receive the name. The word implies professed attainments in special knowledge, as distinguished from mere skill; a practice dealing with affairs as distinguished from mere study or investigation, and an application of such knowledge to uses for others as a vocation, as distinguished from its pursuit for one's own purposes.

"In professions strictly so called a preliminary examination as to qualifications is usually demanded by law or usage, and a license or other official authority founded thereon is required."

This definition is broad enough to include such professional people as pharmacists, chemists, architects, civil and mechanical engineers, etc., whose employment relates to material things, and does not bring them into direct contact with the persons whose needs they supply. Perhaps the moral standards of these professions are upon a somewhat lower level and a little less exacting than those which require a personal acquaintance and a direct application of knowledge and skill to personal needs, as in the practice of dentistry, medicine, law, the Christian ministry, and the professions of teaching and journalism. We are less concerned with nice discriminations of this sort than with the broader generalizations between the professions and the trades and business, and our principal object is to awaken in the minds of students an adequate conception of the very serious obligations and duties to be undertaken in the practice of our own profession and the high level of moral quality that is indispensable to their proper fulfillment. It is only gradually and with difficulty that their moral sense can be awakened and lifted up above the level of the selfishness and greed which are too often observed and expected in the conduct of business and the trades. Of course, selfishness and greed are reprehensible in any occupation or circumstances, but in the practice of a profession they are abominable.

It is of the utmost importance that every influence in the school, from the highest to the lowest of its professors and demonstrators, from the first letter in the preliminary correspondence to the last word of graduating exercises, by precept and example, by the treatment of students, by the management of its clinic, and by the conduct of its business affairs, should prove a moral tonic to every one of its students and keep them in an atmosphere of professional and business integrity, honor and sincerity. The conduct of a dental school is a profession, or rather it is a professional business, as truly as the practice of dentistry itself. Its moral obligations and standards should be upon the professional rather than the business basis in everything that relates to its students, to its patients in the infirmary, to its teachers and demonstrators, to other dental schools, and to the public that is to be served by its graduates. It can descend to a purely business basis only when it comes to its dealings with supply houses, mechanics and laborers. This moral power and influence of a school is determined wholly by the personal character and conduct of the men who are carrying it on, and of such officers of the university as have influence in shaping its policy. The most of the students understand each one of us with approximate correctness, and none of the professions or boasting, or even advise, of opening nights and commencement days will have the slightest influence over them except as it corresponds with their observations and opinions of our performances.

The differences between the practice of a profession and the conduct of a pure business, especially the fact that personal honor and faithfulness joined to knowledge or skill are engaged for the supply of important personal needs, are the chief reasons for the attitude of the profession in respect to advertising. A man may advertise *things* with entire freedom if he does not misrepresent them, but there is almost universal opinion that the paid advertisement of personal qualifications and character is improper, in bad taste, and not consistent with personal self-respect or professional dignity. A man may advertise his professional occupation and the location of his office, but scarcely more. So deeply rooted and universal among professional men is the conviction that public advertising of the commercial sort is inconsistent with professional self-respect, that nothing else will so quickly and certainly cause a man to be ostracised by his professional associates and cut off from all professional societies. Moreover, the advertisements themselves are so commonly untruthful or misleading, and the practice they represent so often incompetent and unscrupulous, that advertising has come to be looked upon as the badge of quackery by the community as well by the profession. Therefore, while it may attract a certain class of patients, it is equally effective to repel a better class.

The details of duties and treatment of patients, and of other practitioners, occupies some time in the course, but need not be repeated here, even if there were time. A few words are given to the obligations of authorship and the ownership of papers read before societies, and the duty of giving proper credit for ideas or words quoted from others. A few words also about duty to the profession in acknowledgement of the debt we owe to the fathers for the body of knowledge and practice which we have received from them ready for our hands to use.

I shall not weary you with much more than a table of contents of the lectures on dental jurisprudence. The Illinois law is carefully explained and especially the requirements for becoming a legal practitioner here, then dental witnesses and the difference betwen common and expert witnesses, and especially the importance of dental experts in some cases for the identification of the dead (sometimes the living). The legal protection afforded by the degree of D.D.S. and the state license, the extent and limitations of practice and the right to give medicines systematically and to administer anaesthetics. A discussion of malpractice and the rules for estimating damages when proven. The liability for infection from unclean instruments. Something about contracts, express or implied, of compensation for services, and the right to charge for loss of time by missed appointments. The liability of a third party for services performed by request. The liability of minors and their parents or guardians. The book accounts of dentists and the collection of debts, and something about partnerships and the liability for the purchase of goods by an assistant. The subject of patents might come under either ethics or jurisprudence. I have not taken it up to any great extent. It is a very knotty problem.

I will not discuss the question whether a dentist can teach dental jurisprudence as well as a lawyer. The latter would have some manifest advantages, especially if his practice had given him special experience in medical or dental cases.

I hope you will agree with me that some such course of lectures on professional ethics as I have briefly outlined will give average students a better preparation than they would otherwise have to respond willingly to the ethical standards adopted by dental societies and everywhere recognized as required by a *reputable* practice. In the societies to which I belong it is customary to have the dental code of ethics printed upon the back of the application for membership, and it is the duty of the board of censors or the committee on membership to ascertain that the applicant has read it and signed his name to it before his application is approved.

The practice of dentistry is to so great an extent mechanical, it is so much easier than in the practice of law or medicine to carry on the routine of daily work without any very frequent or thorough reference to books for the study of cases, and the practice is so general to charge for operations by the hour as plumbers and other mechanics do, that dentists are much more likely than lawyers or physicians to fail to apprehend or live up to the true ideals of a professional life. Too many dentists are little better than artisans or skilled mechanics in their ideals or in the way they think about themselves and act with their patients. Unless he schools make more general and systematic efforts than they have ever done hitherto there is more danger than many of you suppose that the final place and rating of dentistry may be among the skilled workmen rather than among the professions.

What would you think of a surgeon who charged by the hour for operations for appendicitis, or for curetting a nose or enucleating an eye, or even for a house visit or an office consultation?

Discussion.

Dr. Max M. Eble, Louisville, Ky.

Those appointed to teach some special branches in their anxiety to do it well, often succeed in overdoing it. If in my remarks you find this fault do not content yourselves by throwing bouquets at the good points (if there be any) and keeping silent when you see room for improvement, for as I understand it this is not a mutual admiration society, but in every sense a school of instruction. That no other subject in the dental curriculum tends so much toward elevating our calling to the dignity of a profession than a proper conception of the code of ethics *is* my humble opinion. While, as our essayist says, only eight schools announce formal lectures on ethics and jurisprudence, we also know that every school in the land believes firmly in and devotes some but not enough time, and gives not enough prominence to so important a subject. What is everybody's business is nobody's business. How many students, unless they are compelled to, ever read the code of ethics? Last year, in a class of sixty-five, nine only had read it, and they had done so why? Because they saw by the bulletin that the next lecture by your humble servant would be on that subject. While it is true that you can teach by precept and example, who would think of raising a child on those lines or educating a student by that method only? Give me a child from the fourth to the seventh year, and the devil himself will not be able to do much with it the balance of its days, was said by one of our most pious saints. Many of the young men who enter our colleges have been engaged in commercial pursuit, and those who have not are born with that instinct and believe that competition is the life of trade. Not so much for excellence, as for what they can make out of it. Have you ever asked why most students wanted to become dentists? Principally because they think it is an easy vocation where the profits, considering the amount of capital invested, are large. Ask the student in the infirmary what he thinks when he puts in his first amalgam filling, which costs about one cent, and for which the college gets the munificent sum of ten cents, what he thinks, and he will say nine hundred per cent. profit. Now the time to eradicate this idea is right at the beginning of the freshman year, say in November, by giving lectures on ethics. Until year before last my lectures were confined to the senior students of the second semester. Last year we included the juniors, and this year we expect to begin on the freshmen. For, as said before, erroneous ideas should be eradicated right at the beginning. It is not my good fortune to know of a work on ethics, and the many good articles that we see from time to time in our dental journals, while valuable to the average practitioner, are generally too far advanced for the student. My plan of teaching has been as follows: To be sure that the student would at least hear the code of ethics for once in his life, I read Section 1, then begin by analyzing that section sentence by sentence, or often only part of a sentence, and in order to make it as impressive as possible, and when appropo, relate to them a circumstance in my own practice bearing on each particular point. Another method of impressing it is to state that questions will be put on this subject, and as they are all easy we expect excellent answers in our final examination. Some say quacks are born not made, but I firmly believe many are quacks because they were never shown the difference between one who is a dentist by trade, and the one who is a dentist by profession. While it is true that the practice of dentistry is to a great extent mechanical and we can carry on our daily routine work without such frequent and fair reference to books, I see no reason why there should be objection to charging for our services by the hour. Does not the physician who examines for a certain life insurance company for, say $10,000 per annum, charge by the hour? Does not the attorney who acts as counsel for a railroad at given figures, work according to time? Is either of them the less professional on account of that? While there are many operations for which we charge not less than a certain fee and as much more as we can get, such work as treating teeth, abscesses and pyorrhea, I see of no other means at arriving at a satisfactory result. A physician will charge so much for an office consultation and generally twice as much for a visit to your residence, why the difference? Just merely a matter of time consumed. No matter whether you charge $10 for an amalgam filling, or only $5, time is the prime factor. Now as to charging for lost time, if there is any one thing more conducive to bring your patient to the office at the appointed hour, please tell me what it is. Then again, are you not suffering actual loss of capital when an appointment is unkept, and who, if not the patient, should pay for your loss? Have I ever had anybody complain when charged for lost time? To be sure I have, but I have yet to find the first one, when I explained matters, that did not say my position was correct. As my chair does not include jurisprudence, I am not in a position to discuss or give any special method of teaching the same, but concur in many of the ideas of our essayist, though the teaching of the dental law of any special state would be of importance to only a few of your students, and it is ever important to bring only those things before the class which will be beneficial to all. Then again as ignorance of the law excuses no one they will not be apt to be caught napping. For many valuable points that I have learned from the essayist's most able paper, and for the honor that has been conferred by placing me on your programme, I am deeply grateful.

Dr. M. C. Marshall, St. Louis, Mo. The paper presented by the essayist is so full and complete that any discussion, from my viewpoint, is comprised in a hearty commendation of the logical and thorough elaboration of the subject. As there are quite a number of colleges, however (the Marion Sims among the number), that have no special chair on ethics, there might be a question as to its necessity. If taught, for instance, by a special course of lectures, it might seem a thing apart, while on the other hand if each teacher, as occasion presents, and they constantly are presented, should keep his subject permeated with the highest professional ideals, the student becomes saturated in every step of his education with ethical thought and feeling, and of necessity must carry into his professional life a sense of moral obligation. On the other hand, if there is a special chair on ethics, might it not tend to a dismissal of the subject by the other members of the faculty, and if so would not the idea of it being a thing apart, be accentuated, and the subject lose some of the vast importance that should be attached to it? If the author would give us an opportunity to purchase the syllabus he has prepared, I am satisfied his well digested thought would be eagerly sought by all conscientious teachers; we need it, and the profession at large needs it. I regard the following quotation from the paper of the utmost importance, to wit: "Unless the schools make more general and systematic efforts than they have heretofore there is more danger than many of you suppose that the final place and rating of dentistry may be among the skilled workman, rather than among the professions." In this day of frenzied finance the above is a warning that is easily minimized. We are sowing seed. Some will fall upon good ground and we will be able to see fine results; some will fall among tares, and the unfortunate environment will blight our best efforts. Yet we must do the work as thoroughly as possible for we

"Sow a thought and reap an act,
Sow an act and reap a habit,
Sow a habit and reap a character,
Sow a character and reap a destiny."

Dr. J. H. Kennerley, St. Louis, Mo. I want to congratulate the essaysist on his paper, and also to make a correction. I understood him to say that the Dental Department of the Washington University did not teach jurisprudence. We have had a chair of jurisprudence for a great many years. Dr. Noyes evidently overlooked it. While we never established a regular chair of ethics, yet we have fifteen men teaching ethics. There is not a teacher in the institution who loses an opportunity to imbue his classes with the necessity of ethics; not only in the senior year, but also in the freshman year. All our teachers are enthusiastic on this subject and they never fail to inculcate the principles of ethics into the students. While it might be well for us to have a separate chair to teach ethics, yet I am rather inclined to agree with Dr. Marshall that if we had such a chair the other teachers would fail to do the work they are now doing, and thus our classes would be deprived of much valuable advice that they receive from the time they enter the college. The time to begin teaching ethics is to teach the boy, no matter where he is. The sooner he learns it and makes it his code of living, the better his professional life will be.

Dr. A. G. Friedrichs,
New Orleans, La.

I think a great deal can be done in this respect by the way we manage our clinics. More harm has come to the profession by the way most college clinics are managed than by any other one factor. These clinics should be conducted on the same plan as we conduct our private practice. It is a bad thing to advertise the clinics. Everything done in the clinic should be ethical, and I have always attempted to carry that out. Of course, it is desirable to have a chair teaching ethics, but there is not a man connected with our school who does not inculcate these principles to the best of his ability. We begin with the freshman and we continue to tell them about it until they graduate. I show them the necessity for being ethical, and what comes of being unethical. Teach them to be ethical and to retain their professional self-respect. If you succeed in doing that while they are in college you will have fewer unethical practitioners of dentistry.

Dr. H. A. Smith,
Cincinnati, O.

This paper carries me back to the time when the code of ethics was adapted by the American Dental Association. It was presented by Geo. Watt, M.D., D.D.S. The code was adopted from the medical code and it was done exceedingly well. Dr. McQuinlan, of Philadelphia, was not in favor of it, because, he said, a gentleman does not need any restraint. If he is not a gentleman no code on earth will restrain him from doing what he pleases. But the code was adopted almost unanimously. When the new organization, the National Dental Association came about, a committee was appointed to revise the code, but no change was made, except in the article on consultations, which is almost new matter, and is one of the important sections in the code. The amount of time to devote to the teaching of ethics is an open question. It does not require a large number of lectures to elucidate the doctrine contained in the code; five to ten would be sufficient, and these should be given to the senior class. If an impression is made at all, let it be made at the last. Dr. Noyes' outline of his lectures on jurisprudence is practically the same as that given in Rehfuss' Dental Jurisprudence. If that book could be placed in the hands of every dental student it would be a good thing. But it needs a thorough revision, and all that part relating to the state dental laws left out. Another excellent book is McClellan's civil malpractice, written by a physician-lawyer. The principles of dental jurisprudence are not very extensive. They are easily comprehended and can be given in a few lectures.

Dr. S. H. Guilford,
Philadelphia, Pa.

We have a jurisprudence course in our school. I question very much whether, as the course is now constituted, we have very much time to devote to the subject of ethics or jurisprudence. When that is taught from a regular chair, we are apt to occupy too much time that is needed for other subjects. I believe in a certain amount of it, but we ought not to give a great deal of time to these subjects. We have an eminent lawyer deliver three or four lectures on dental jurisprudence and they are given in the evening. They cover the usual ground, questions of malpractice, identification of the dead, contracts, liabilities, accounts, etc., are taken up in regular order and in an entertaining way. We have no set lectures on ethics, but every teacher in the school makes it a point to inculcate the principles of ethics in his lectures all the way through. Lectures on ethics may become very dry, if carried too far. Much depends on the character and practice of the men teaching. It is a question of our daily life and example to those young men, and an occasional word or explanation or invitation to come to our office and see how we conduct our practice is worth more than a great deal of didactic teaching. I deliver a few lectures every winter on dental malpractice and ethics, taking in a great many subjects, such as the beginning of practice, signs, treatment of fellow practitioners, keeping accounts, collecting bills, saving and investing money and all that. When condensed and put in popular form it is better received and makes a more lasting impression. There is no doubt in my mind that the dental parlor is the natural outgrowth of the college clinic. It is in college that students see many working at the chairs, doing much work for a small fee which amounts to a great deal in the aggregate, and they conceive the idea that if this can be done there the same thing can be done on the outside. Yet with all that we cannot dispense with the college clinics, for they are as necessary to the dental student as the hospital clinic is to the medical student.

Dr. W. M. Bartlett,
St. Louis, Mo.

Judging from the paper and the arguments presented, it seems to me that instead of advancing we are retrograding. Twenty years ago it did not require the preliminary education to gain entrance into a dental college that it does to-day. We never heard these subjects discussed before bodies of this kind. To-day the majority of schools require two years of high school study, and some require graduation from the high school, to place a man in the position to discriminate between right and wrong. The chair of ethics really makes an effort to teach the educated student to discriminate between right and wrong. What is dental ethics? It is the man himself. If a child has an honorable father, the chances are that he will himself be an honorable man when he grows up. In his college life what are his examples for conduct? His professors, the conduct of the college. If the man who stands on the rostrum conducts himself in a professional way he is an inspiring example to his students. He does not have to tell them about the code of ethics. A student who sees his college advertise for gain, naturally, when he graduates and receives no patronage, will wonder why he cannot do the same thing. I have more respect for the man who openly advertises that he fills teeth for twenty-five cents than for him who makes use of the papers for personal aggrandizement, or for those who blackguard their fellow practitioners. Of the three, the advertising man is the most honorable because he lives up to his principles.

Dr. A. W. Thornton, Chatham, Can. I think that Dr. Noyes' paper is not second to anything that will be discussed at this meeting. I was particularly impressed with what Dr. Fredrichs said that students sometimes learn unethical ways in college. I wonder if there always exists among the professors in a college that harmony that there should be. How long does it take students to discover the fact that there is a lack of harmony? That one professor is, metaphorically speaking, cutting the other professors' throats. And they go out and do what their professors did in college. The fact of the matter is that mind is not the standard. There is an answer to that question, What is the chief end of man? It is the pursuit of happiness, and the standard in this country is the standard the world over. Men are rated by the gold standard. The man who makes money is the man who is looked up to. And that is the reason why men who recognize that fact run dental parlors. That happiness is to be obtained along the line of making money, regardless of how it is made. If they get enough of it they will have recognition. A short time ago, in one of our eastern states, a dentist was refused admission to a club because he was a dentist. I am glad I am a dentist; glad that I can associate with the men who surround me to-night, but when I walk along the street and see a big gold tooth hanging before some dentist's office I pass with my head down. We must be honest in our colleges and teach our students that the attainment of wealth is not the chief end in life, but to be men among men.

Dr. Noyes

It would be lamentable, I am quite ready to admit, if the teaching of ethics as I suggested, were to diminish or prevent, or in any way curtail the expression of ethical principles and ideas by every professor in the school. Such a course in ethics is not intended to displace that line of teaching. But, gentlemen, is there in one of your schools a chair from which the foundation on which professional ethics stands is elucidated so that the student can comprehend it better than he can by listening to the desultory method of teaching by everybody? Do they comprehend why it is that it is considered bad to be a quack advertiser? You must give men a better basis for ethical conduct than mere business policy, or the custom and requirement of the profession, if you want to stand on sure ground. The great effort I have made in this course of ethics is to put such a solid foundation under the feet of my students that they may see that a professional occupation is different from that of the merchant or mechanic, and that the moral obligations are also different. Too much cannot be said in regard to the importance of conducting college clinics so as to avoid creating erroneous impressions on our students. A short time ago a student of mine handed me an advertisement clipped from the paper. The advertisement was so worded that one might infer that not only the treatments in the infirmary were free, but also the fillings and crowns and plates. It would not deceive anyone well acquainted with a college clinic, but I told my class it was very objectionable because of its apparent intention to mislead. The dental college is a public institution, and the clinic is conducted for educational purposes primarily, and its rights and privileges are somewhat different from those pertaining to private practice, but it must be administered with the greatest care in respect to its ethical aspects and influence. No plan has yet been discovered by which colleges can avoid creating some quack dentists and quack physicians, and the opportunity to hang the head is just as good for the physician passing along the street as it is for the dentist, and this in spite of the fact that the medical code of ethics has been the recognized standard for professional conduct for a hundred years. The original code of ethics was written in a series of letters by some physician in England to his son who was about to graduate, and the phraseology of these letters has been preserved in part to the present day. The code in use up to last year was adopted about fifty years ago when the American Medical Association organized, and Dr. N. S. Davis, of Chicago, was a member of the committee which drafted it. Some of the gentlemen think that we cannot afford to give so much time to this subject. My course does not take a great amount of time, one lecture a week from the first of October until about the middle of January, eleven or twelve lectures and an examination. Any young man can become well acquainted with the dental and medical codes of ethics, and, with the aid of this greatly condensed syllabus, can learn the main points discussed in the course, in a very few hours besides the lectures, and it does not seem to me too much time to give to so important a thing as the comprehension of the fundamental ideas and standards of professional ethics.

The Faces of Pluggers.

By Edward A. Royce, D.D.S., Chicago.

(Read by Dr. Cattell.)

The importance of plugger faces can hardly be overestimated. By their size they control the condensing force delivered to the gold. By their surface, either smooth or serrated, they, to some extent, control the density of the filling, and by their shape they almost entirely control the direction of the force delivered to the gold.

As the amount of force that can be successfully resisted by a tooth is limited, if you wish to increase the condensing force of the plugger it can best be done by reducing the size of the face. If a pound of force is delivered to a plugger, the face of which is one millimeter square, the particles of gold will receive one pound of force, while if the plugger face is two millimeters square, the gold would still receive only one pound of force, but as the force would be distributed over four times as much gold the same amount of gold only receives one-quarter as much force as it would under the first conditions, thus reducing the condensing quality of the force three-quarters. This subject has been ably discussed in the past by others, so we will pass on to the consideration of the surfaces of plugger points, whether smooth or serrated, both of which have their advocates.

Dr. C. A. Hawley, of Columbus, Ohio, read an admirable paper before the Ohio State Dental Society, in 1901, detailing some experiments which seem to prove that gold condensed with smooth points was more dense than that condensed by serrated points. This may be all right theoretically, but my experience has been that clinically the serrated points are more practical, because, in the use of smooth faces, there is a fine point between condensation and burnishing which is very difficult to distinguish, and few operators have become sufficiently expert to thoroughly condense their gold without burnishing; therefore, most of them prefer finely serrated points, as they leave the filling in better condition to receive the next piece of gold.

I have only briefly called your attention to these two important features of pluggers, as the third one, the shapes of plugger faces, I have been requested to give more in detail.

It is a fact conceded by all that the mission of a gold filling is to mechanically stop a cavity, so that no fluid can penetrate between the filling and the cavity wall. This being the case, our efforts should be directed to find and adopt methods which will enable us to most thoroughly calk the cavities.

It is easy to build up cohesive gold into a dense filling, but with the methods in general use it is exceedingly difficult to make a perfectly fitting cohesive gold filling. The adaptation of non-cohesive gold to the walls of a cavity is always held up to us as an ideal; therefore, let us consider the methods used that bring about this ideal stopping.

Non-cohesive gold, as you all know, is used in strips, mats or cylinders, placed in the cavity in such a manner that they will reach from the bottom to a little above the enamel margin, and the gold is then condensed by forcing a tapering or wedge-shaped instrument down between these mats or cylinders thus forcing them to the sides. The opening made by the plugger is then filled with gold, and the gold is again wedged to the sides, and this process is continued until the required density is obtained. Now, let us find out how force is delivered to the gold by the faces of this wedge-shaped plugger. A safe rule is this: Force is delivered nearly at right angles to the face at the point of delivery. Just here let me say that in connection with these illustrations I am obliged to quote from papers presented by me to local societies, for mechanical illustrations cannot be varied.

A wedge is a double inclined plane. The inclined plane in its resistance to gravity resolves that force into two forces, one of which is perpendicular to the face of the plane, and is destroyed by the plane; the other force is parallel to the plane. The law given in Quackenboss for the wedge is like this: The force is increased as many times as one-half the thickness is contained in the length of the wedge, so if a wedge is two inches thick and ten inches long, one pound blow upon that wedge causes the wedge to exert ten pounds of force, and that force is exerted at perpendicular or right angles to the plane. If one pound of force is exerted upon the wedge, it moves in the line of impetus until it meets a resistance of one pound in a direction opposite to the line of impetus, or is acted upon by some other force, according to Newton's second law of motion, but this law does not control the delivery of force by the wedge. I have in my possession a wedge-shaped instrument that has been used by me for a gold plugger for some time, measurements of which show that its length is six to thickness two. Now the force is increased as many times as one-half the thickness (or one) is contained in the length, which is six; so if I exert one pound of force upon the plugger to drive it down between the the cylinders in non-cohesive gold, I exert six pounds of force to drive the cylinders to the walls of the cavity. Of course, the tooth as related to its socket receives one pound of force, and that pound in the line of impetus.

Let " A-B-C " of Fig. 1 represent the point that is crowded into the gold. Now we have seen that the force is given off at right angles to the surface that delivers it. So the force delivered by the surface " B-C " will be delivered in the direction of " X-D " but there is resistance of the gold which is held in place by the bottom of the cavity, so the force is diverted toward ''E,'' making a direct lateral pressure toward the walls of the cavity.

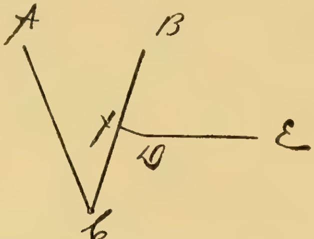

Fig. 1.

This lateral force is so great that teeth are frequently split by its careless application.

With cohesive gold the wedge-shaped plugger cannot be used, because after the gold is placed in the cavity, it cannot readily be penetrated by a wedge-shaped point, and if it is so penetrated, would not adapt itself to the walls of the cavity on account of its rigidity. So, when filling with cohesive gold, a plugger with a flat face was adopted and lateral force abandoned, and each piece of gold was supposed to be placed in the exact position it was to occupy.

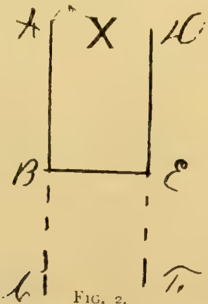

Fig. 2.

Let ''X'' represent the plugger for cohesive gold. The force delivered to ''X'' by a blow is conveyed to the gold at right angles to the face delivering the force. So the force in this case is projected straight ahead of the plugger.

Lines " A-B " and " D-E," show the boundary and direction of the force, and lines ''B-C'' and ''E-F'' show the boundary of the practical effect of the force. With a flat-faced plugger it is not possible to obtain any lateral force unless the point is directed toward the sides;

in case that is done, dents are made in the gold by the corner of the plugger, which it is a practical impossibility to fill. If any spreading occurs under a force from this point it must be deep in the filling.

Another, and very important, plugger face which we must consider is the convex. There are a great many different forms of convex faces, but after the principles that control the workings of the convex point are understood, it will be easy to select the form best suited to the work required. Every point on the surface of a convex plugger is a point in the segment of some circle, and that circle can be formed by extending the segment; so if we can find the direction of the delivery of force from the point in the circle, we will have the direction of the delivery of force for the point on the surface of the plugger face.

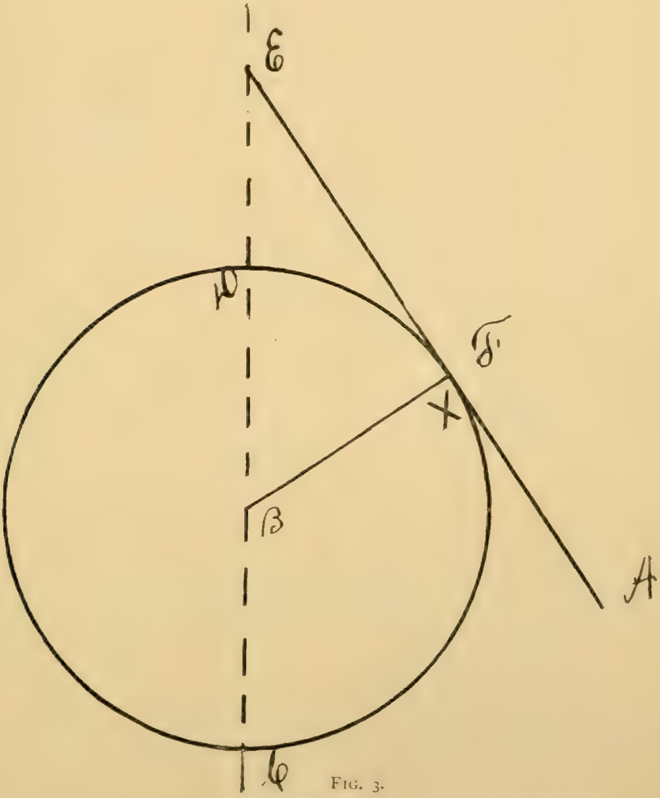

FIG. 3.

We will draw a circle and let the diameter "D-C" represent the line of force and select point "X" as the point for the delivery of the force and draw radius "B-X." Through the point "X" we draw a tangent to the circle; it will give equal angles and right angles, "E-X-B" and "B-X-A"; extend "D-C" till it intersects tangent at "E"; now the point "X" is not changed a bit in position, form or relation to the line of force, which relation is shown by line "B-X" but it has become a point for delivery of force, not only for the circle, but for the inclined plane "E-A," and the force is delivered at perpendicular to the plane. The same point delivers the force for the circle that delivers it for the plane, and the relation to the line of force is the same in both cases; therefore, the delivery will be the same, and the force will be delivered in the direction indicated by the extensions of radius "B-X," which is also perpendicular to the plane before spoken of.

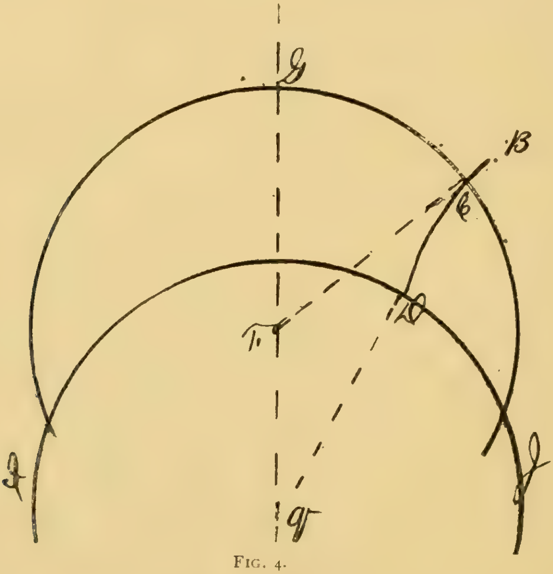

Fig. 4.

In illustration No. 4 a disk represented by half circle "I-J," was pushed up to the point represented by "G"; at point "D" of this surface a lead pencil was held lightly by a finger placed upon its top in such a manner as not to influence the direction in which the pencil moved. As the disk was moved up, the pencil mark the mark "D-C-B." It is readily seen that "D-C" is almost an exact extension of the radius "D-Q," and that the line of "C-B" is an extension of the radius "F-C." Line "D-C-B" curves as it progresses, and the curve increases just as the point that delivers the force changes its position upon the circumference of the circle.

The diverging force of a convex point meets the resistance in the filling, which converts it into a lateral force, in the same manner as in the case of the wedge. This can be figured out mathematically, but it can also be shown conclusively by demonstration.

Line "A-B-C" represents a disk, the line of force being "X-Y." A lead pencil was held upright at "B," as in Fig. No. 4. As the disk moved forward, the pencil point was forced out to point "G," at which place it met resistance of a card placed at right angles to the line of force, and the force was diverted, so as to send the pencil parallel to the edge of the card and toward "E." This shows exactly what occurs when force is exerted in a direction divergent from the line of force.

The foregoing demonstrations show that force delivered by a flat face is distinctly a driving force, as distinguished from a spreading force, the gold being carried directly ahead of the point, and any lateral force, which may be given, is deep in the filling. When this shaped face is used the gold must be placed just where it is wanted, and the plugger so directed as to drive the gold straight ahead of it, and as the gold is condensed in other parts of the cavity, the tendency is to draw or curl the gold away from the walls of the cavity by driving it down in the centre.

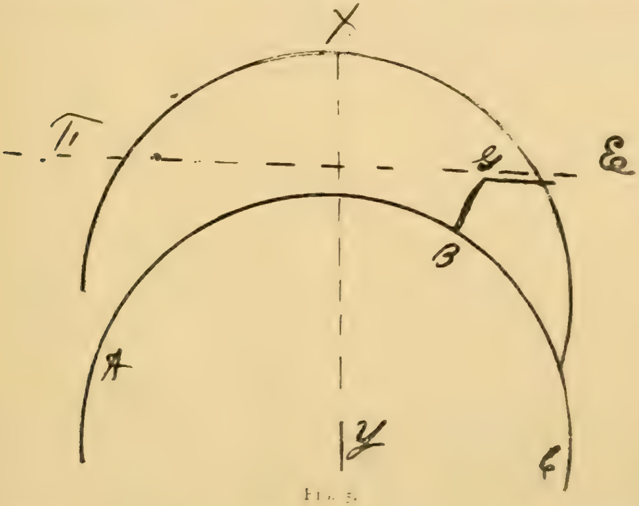

Fig. 5.

It was well said by Dr. S. G. Perry, of New York City, in a recent paper upon gold fillings, that "Most operators make their fillings unnecessarily homogeneous and strong, but no operator ever made a filling fit too well."

I would lay particular stress on the fact that "no operator ever made a filling fit too well." With the methods in common use, the direction of force is such as to make it almost impossible to make a perfectly fitting filling. Now, if we can change this so as to make the tendency of the gold to travel toward the walls of the cavity instead of away from them, is it not our duty to do so? If a mechanic wishes to spread a rivet, he uses a hammer with a convex face to do it. If a gold-beater wishes to spread gold to make foil, he uses a convex hammer. If a dentist wishes to calk or plug or stop or fill a cavity in a tooth, why does he not do it according to the laws of physics, and use a convex plugger face?

The demonstrations I have made certainly should convince anyone that there is merit in properly-shaped convex points, and by their use cohesive gold may be made to perfectly fit a properly prepared cavity by the intelligent application of the spreading force; or perhaps it would be more proper to say the combination of a spreading and driving force; the spreading force, on account of its tendency to force the gold toward the walls of the cavity, and the driving force for the solidity of the filling. As it may not occur to you at this moment, the shaped face which will properly condense gold and at the same time give lateral force, I will give you the outline of a plugger face that is largely used for this purpose.

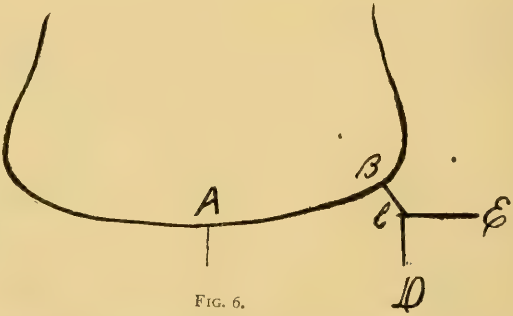

Fig. 6.

Now, if we subject this point to the same study of forces, what do we find? Force given off in the center at "A" will be delivered on a line with the resistance, so the force will be projected directly ahead; but at either side of the center the force is given off so as to force the gold in a direction at a greater or less angle to the resistance, as at "B" to "C", and it meets the resistance forming the angle "B-C-D."

Now, however obtuse this angle may be, if the direction of the force and the resistance are not in a continuous line, the force will be diverted, making lateral force of it and causing the gold to spread at every blow of the mallet. The spreading under force of this kind is not a spreading deep in the filling, but at the surface upon which the force is delivered.

On the face of this plugger, or what might be called the working face, as it is not so much rounded, cross serrations are used, and they will have a tendency to lessen the spreading force and increase the driving force, but at the sides, where the lateral force is greatest, there are no cross serrations, so that the spreading force is not in the least diminished.

The question might arise as to our ability to spread the gold with the force used in filling teeth. It seems unnecessary to argue this at the present time, but I will simply state that it can be done, and I have exhibits with me which I will be glad to show to anyone.

That this method of manipulation will assist us to make our fillings fit is no longer a matter of speculation—it is known to scores of operators who have been using it for years, and a most striking illustration of the work done by this shaped plugger point is the fact that in the infirmary of one of our best dental colleges the number of fillings malleted loose during the process of condensing gold in the cavities has been reduced one-third, simply by the use of convex points.

When you remember that this change has been brought about by students who are novices in the art of dentistry, and who have not had the advantage of years of study and work as to the best methods of using gold—we are obliged to confess that it is not their skill or ability which has wrought this change, but that properly shaped instruments have been placed in their hands, and they have been taught the laws and mechanical workings of these instruments, and thus are able to avail themselves of the proper force (whether condensing or spreading), and to use that force in the proper places. If such results are accomplished in the hands of novices, what might we not expect of men skilled in the use of fine instruments, and accustomed to doing fine work, if they would make a study of the laws of physics, and conscientiously prepare themselves to take advantage of everything that will advance the standard of their work? I am not alone in hoping to see applied physics one of the prominent studies in the curriculum of every dental college. Those who have studied mechanics, realize its importance to the dentist, and the students who are taught the laws of physics and the control of force will be able to do their work more intelligently and therefore more perfectly. If a man who has been working with flat points for a lifetime should take up a convex point, he would naturally use it as he had been accustomed to use the flat plugger, and if he expected his cohesive gold to at once fit into the cavity, he would be doomed to great disappointment, for no such thing would happen. But if he will study carefully and intelligently the mechanical laws that govern lateral force, and obey them, he will be happily surprised at the ease with which cohesive gold may be made to submit to his will.

Discussion.

Dr. A. G. Friedrichs, New Orleans, La. This matter of force is nicely illustrated by Dr. Royce, and it is exactly what happens. The instruments which I use are conical-shaped pluggers, round pointed, varying in size. No manufacturer has thus far kept these pluggers on hand. You must make them yourself or order them to be specially made. The kind of pluggers we use are on the wedge-shape principal, and I have always contended that with a soft foil we could be more sure of a perfect adaptation than by any other method. As an illustration of that I have the evidence in my own mouth. I have a lot of soft foil fillings, none of them less than twenty years old, put in according to the cylinder method devised by Dr. J. S. Clark. What was said about the operation of force, went absolutely in line with what is demonstrated in my mouth. By using the wedge method, and force on that principle, and soft foil, the gold can be spread and you can be absolutely sure of getting a perfect filling.

Dr. J. D. Patterson,
Kansas City, Mo.

I would like to ask how the lateral walls can be made as perfect as they might be with a more square-pointed plugger. We shape the cavity in such a manner that it seems to me these convex points are not applicable in perpendicular lateral walls. How can as good a joint be made at the periphery of the cavity with these pluggers? These pluggers are better adapted to the old form of concave surface at the cervical part of the cavity, but not to a cavity shaped as we make them now. I have tried these pluggers and have failed in making as good a joint without having recourse to the square or nearly square foot shape.

Dr. M. C. Marshall,
St. Louis, Mo.

The essayist tells us that with a flat-faced plugger we are liable to drive a hole into the gold. I think that any gold put into a cavity as susceptible of having a hole driven into it by a flat-faced plugger, has been put there through ignorance. I believe one of the principles of filling a cavity with cohesive gold is to condense the gold, unless you wish to fill the cavity largely with non-cohesive gold and then finish up with cohesive gold. The law of force as applied here can be modified by the crookedness or straightness of the shaft of the plugger. He talks about one pound of force being produced on the face of the filling. I think that would be modified largely by the plugger. I try to have all crooked plugger shanks eliminated and to use one as straight as possible to get the proper force at the point of the plugger, and I teach that the preparation of the cavity should be such that you can reach those lateral walls perfectly well, in the majority of cases, with a straight shaft plugger, and not to use curved pluggers in all cases where they can be avoided. I have never been able to get the best results with convex faced pluggers, and students should not be taught anything that they are not expected to use and develop in their practice, or that will tend to make them more deficient than they are. We should teach them to use flat-faced pluggers with straight shafts, and I do not believe that gold properly condensed into a cavity by a flat-faced plugger is susceptible of having a hole punched into it by any reasonable force.

Dr. Cattell There is nothing in the paper that had any bearing on Dr. Marshall's remarks with reference to driving a hole into a filling.

Dr. J. D. Patterson. I beg your pardon, there was.

Dr. Cattell. Dr. Royce was not talking about the blow or force that hit the end of the plugger up at the handle, but the force that the face of the instrument is conveying to the gold. It is the force delivered to the gold, not that which the mallet gives against the end of the plugger.

Dr. S. H. Guilford, Philadelphia, Pa. We must recognize that we have here two different conditions. In the first place, in the application of force if done by hand pressure, and in the case of the mechanical plugger it is done practically by mallet force. In filling with non-cohesive gold, and using an instrument shaped on the wedge plan it is pressed from side to side in order to condense the gold. Now, at the point of the instrument there will be little condensation, but more and more at the surface. That is the idea in packing non-cohesive gold with wedge-shaped instruments. With the use of cohesive gold we propose to make the filling dense from the bottom up, every part as nearly alike as possible, and here is where differently shaped instruments come into play. I teach my students that with square-edged instruments there is danger of tearing the gold, and besides we are not so sure that we get the gold thoroughly united. The way to overcome that is to eliminate the edges. If square-faced pluggers are used the edges should be rounded. Another point is to get the force in the different directions. I have used these convex pluggers for many years, and I think the principle of their construction is correct. The illustrations demonstrated that, and I do not see how we could have force applied to better advantage in the condensation of cohesive gold than by the Royce convex-faced pluggers. They appealed to me the moment I saw them, without any demonstration, and I am satisfied with their working in every way.

Dr. Patterson. It is an important question to decide whether this procedure is a good one to teach. I do not believe it is.

Dr. A. W. Thornton, Chatham, Can. This discussion emphasized the fact that a chair of physics is somewhat of a necessity in a dental college. The question propounded by Dr Patterson is one which would naturally arise in the mind of every thoughtful teacher. How can you pack gold into a square corner with a round instrument? If there is a man in the profession who has given the question of physics more attention than any other man, it is Dr. Black, and he and Dr. Patterson are running parallel. He advocates the use of square-ended instruments in packing amalgam rather than the round or bald-headed instruments we have been using. When you come to deal with this question mathematically, it seems to me that Dr. Patterson is correct, and this is the view students will take when we attempt to demonstrate that from the chair.

Dr. Edmund Noyes,
Chicago.

This last question is a simple one. When we talk about square corners, if we carry the angle of the cavity to a sharp right angle, it seems to me that it is plain enough that the angle of our plugger point must be as sharp as the angle of the cavity, but that angle only needs to be rounded a little to correspond with the convexity of these small convex faced pluggers. The relation between the two is important and should never be overlooked.

Dr. W. M. Randall,
Louisville, Ky.

These are important points that bear closely on the subject of physics. We have two general classes of plugger points, those used for non-cohesive gold and those used for cohesive gold. As I understand it, the latter class may be round, convex or square with flat surfaces, and those used for non-cohesive gold should be wedge-shaped blades, related to handle at different angles. I think the one is just as important as the other. It is a serious mistake that most colleges do not teach the principles involved in filling cavities with non-cohesive gold. The question is, how can we best teach our students the technique of these different operations. That is a most important question for this body to consider. I think the paper explains some of these various principles to a nicety and it would be well for each professor to have such charts as these showing the results that can be accomplished by the application of the truly physical principles envolved in this very important phase of operative dentistry. In teaching the use of non-cohesive foils I have used large models, not attempting to show the manner of condensation nor the amount of force used, but simply to illustrate the principle. The first impression conveyed to the student is the most lasting one, and if he gets the proper idea in the beginning, he will have no trouble in understanding the practical ideas of these models later in his course. How often you can see a senior who has not studied the working of non-cohesive foil, but who has thoroughly mastered the cohesive. He attempts to insert a non-cohesive filling and almost invariably fails. I think the non-cohesive material should be taught in our technique courses as well as the cohesive. Tin foil will carry out this idea from beginning to end as well as any substance I know of; almost equally as well as gold. In conjunction with the large models of cavities I use cotton rolls to represent the rolls of gold and tin, and specify that these should be at least one-third longer than the cavity is deep. If the cavity is a large one, roll the gold sufficiently large, say one-twelfth the diameter of the cavity, thus inserting twelve of these cylinders. Then I take a large model wedge-shaped plugger and go through the procedure of inserting a non-cohesive filling, showing why that plugger is the proper one, and which pluggers should be used for cohesive material in the various steps of the filling process and in the different classes of cavities.

Dr. Edmund Noyes, Chicago.

It seems to me that the most important consideration with regard to the face of the plugger has not been mentioned in the discussion, and only alluded to in the paper. I mean the size of the plugger points, the amount of surface of gold covered at each application. If the use of pluggers with convex faces carried with it the tendency to make plugger points a little larger than they are now the possible advantages of that form would be more than neutralized by the increase in size. There is a question in my mind whether the nice adaptability of forms to uses has been improved in this particular since the set made by Royal W. Varney. His adaptation of sizes of plugger points to the force that can be used on a tooth was almost final and ideal. It is my belief that three-fourths of the students and practitioners use plugger points too large to accomplish thorough work.

Dr. H. E. Friesell, Pittsburg, Pa.

One gentleman said that he thought a chair of physics should be established in each college. I think we could say that a chair of physics might with advantage be established in the Institute of Pedagogics. I think Dr. Patterson referred to the packing of gold between two parallel walls. Dr. Guilford said that the small size of the round plugger point enabled him to pack the gold perfectly against a flat wall. I do not agree with him. I require a flat-faced plugger. I teach my students that the inherent properties of the gold are worthy of consideration. You can take a piece of gold (that has the properties of malleability and ductility) and by striking it with the face of a hammer held at a certain angle, you can drive the mollecules of gold to any corner. You can do that with the gold in the filling. The way to pack gold against a flat wall is to pin the gold to be placed to the middle of the gold already placed, then step the plugger toward the wall. In this way the gold is wedged down tight and condensed against the wall in the same way as it spreads under the hammer of the gold-beater. Five or six pounds of force are more effective with a fine-pointed plugger than twenty pounds with a plugger four times as large. No matter what gold students are using, teach them to put it into proper position. With the Royce plugger and a straight shaft the force is in a direction parallel with the long axis of the instrument. If you hold the plugger tight against the gold it cannot drive off and burnish the gold, but the serrations have a tendency to pull the gold away from the margins rather than force it to them. In my practice I occasionally have use for a Royce plugger. I cannot tell you just where, but I have use for it once in a while. Dr. Marshall spoke of using a straight-shafted instrument; in 95 per cent. of cases it should be used, but there are cases where you cannot use it and get the gold perfectly applied without cutting away an unreasonable amount of tooth structure. I always instruct my students not to use a ball-headed plugger handle; but a square one to be struck square in malleting. If you use a plugger with a bayonet-shaped shank you can drive gold into the axio-labial angle.

Dr. J. Q. Byram, Indianapolis. It occurs to me that you are teaching mallet pressure and not hand pressure. Everyone has spoken of the direction of force with the blow of the mallet. We have our students get flat-faced pluggers and convex-faced pluggers. We teach them at the side of the cavity, the gingival wall should be at right angles with the buccal and lingual walls, and we have them get pluggers that form such angles with these cavities. If we do not form an angle, our oval-faced pluggers come in to good advantage. Most of the force should be directed to the seat of proximo-occlusal cavities with the hand, and if that is done, I do not see why there should be so much trouble in condensing the filling against these walls. For amalgam pluggers I buy blanks and have the boys make up a set, and I find them a very valuable adjunct to the technic course. It is not only inexpensive, but it gives them a set of pluggers better than they can buy. They are made on the same principle as Dr. Royce's pluggers, except they are not serrated.

Dr. A. W. Thornton, Chatham, Can. There is some physics in this question after all, and while we do fill teeth and get results in our teaching, we must teach eternal principles. There is only one exact science, and that is the science of mathematics. Take a square corner and put a flat instrument against it; you will find that the upright wall and base will be closer to the plugger point than the extreme angle, and the gold will be condensed to the limit at these points but not in the angle. So that while there is a practical side to this question, there is a mathematical side as well.

Dr. Cattell. I feel very much discouraged because but few things have been said that had any relation to the paper. I do not like to read a paper and have everything discussed except the paper. The subject of this paper was "The Face of Pluggers" and not whether we should fill cavities with cohesive or non-cohesive gold, or other subjects talked about. This paper is not on "Dr. Royce's plugger" and he is not talking about his plugger. He is talking about the *face* of a plugger and the force that comes from that face and is delivered to the gold, and what will happen to the gold when the force is delivered. Drs. Black, Webb, Butler and Atkinson and others made convex-faced pluggers years ago. The convex-faced plugger is a modified wedge, we cannot get away from that fact. Some of you talked about the shaft. What part is the shaft? You mean the shank. There is a difference between them. And another one mentioned something about the lines of force following the line of the shank. I always supposed that no matter how crooked the shank of an instrument, the force always travelled in a straight line from reception to the point of delivery. It does not turn corners or follow curves. In our laboratories if we want to spread a piece of gold we use a convex-faced hammer. If we want to spread the head of a rivet, we use a modified wedge; if we want to lengthen a wire, we use a pair of pliers that have convex-faced beaks. We teach our students about all that. We tell them how gold-beaters spread gold under the force of convex-faced mallets, yet when we teach them how to fill cavities with gold, we forget all about laws of force. We never tell them that the gold can be spread as easily there as in the laboratory. The force delivered by a convex surface changes the direction of the movement of the gold so easily and so readily, and yet we do not teach it. It is so little understood by the profession that Dr. Royce, and others, have taken occasion to speak and write about it often. As to the size of the plugger points: How many of us tell our students that every time they change the instrument from a small-faced plugger to a large one they must change the amount of force delivered to the gold, or rather change the amount of force delivered by the mallet. We wish to condense gold. It requires a certain number of pounds pressure to condense a certain surface area of gold. Let us say we are condensing it with a small point; then we change to a large point without increasing the amount of force delivered by the mallet. Are we condensing the gold as before? No. Let me refer to a paper I read a few years ago on that point.

"For condensing the main portions of a cohesive gold filling the impacting area of the plugger should seldom be more than one square millimeter, and generally plugger points of one-half to seven-tenths millimeter area should be used. The area of a plugger point is practically the square of its diameter. That is, a point one millimeter in diameter has an area of four times as great as one only half a millimeter in diameter. Five-tenths multiplied by five-tenths gives twenty-five as the area, while ten-tenths multiplied by ten-tenths gives one hundred, or four times as much.

"This being true, a reduction of the size of the plugger point below one millimeter increases the condensing power of the impact in proportion to the reduced area, and increasing the point above one millimeter diminishes the condensing power of the impact in proportion to the increased number of squares of area. Twenty-five pounds of impact or pressure on a point one-half a millimeter in diameter is equal in condensing power to one hundred pounds upon a plugger point one millimeter in diameter. Therefore, to make solid fillings, small condensing points must be used. We must not, however, use points that are so small that they will penetrate the gold and chop it instead of condensing it. Therefore, we should not use heavy blows with very small plugger points. For some special places about margins, or packing in delicate grooves, a smaller point used with lighter force is useful. And occasionally a larger area than one millimeter in the form of "a foot plugger" may be useful in packing over certain cavo-surface angles."

Royce refers to earlier teachers, and I have looked up the Dental Cosmos for 1896 where a paper is published on the specific gravity of gold fillings written by Dr. Black. "The specific gravity of gold is 19.3—19.4. Fifty experimental fillings were made in steel dies by as many operators all over the country. The specific gravity of these fillings ran from 12.53 to 18.74, an average of 16.79. It was shown that fillings of less specific gravity than 15 would not stand the stress long, hence the necessity of using the smaller faced points and heavier malleting or continued malleting. *Condensation* is the important point in preventing movement or dislodgment. Fillings less than 15 specific gravity are so porous as to imbibe moisture and small particles of food, and they soon become foul.

A filling 12.53 specific gravity requires only 15 pounds to reduce its length 2.5 per cent.; while one of 16.26 specific gravity requires 225 pounds pressure to reduce it 2 per cent.

These experiments were carried on very carefully, and many fillings turned in were so porous, so low in specific gravity that they practically could not "stop" a cavity.

Again, if gold is not condensed sufficiently, it will spread out and move from its position. The size and face of the plugger, and the force and delivery of the blow have all to do with getting the proper specific gravity, and all this should be gone into thoroughly with our students. They are intelligent men, and these problems of physics should be given them most carefully. If we give them the principles they will soon learn how to apply them, but if we simply talk about making fillings with this or that kind of instrument without explaining why we do it, they are in the dark, just as many practitioners are to-day, and I fear as many teachers.

Orthodontia.

By S. H. Guilford, D.D.S., Philadelphia, Pa.

In considering some of the problems of orthodontia with my class I might take up the matter of "Physiology of Tooth Movement" and the "Application of Force."

In such event my first question probably would be:

Q.—What physiologic changes occur in the surrounding tissues in the moving of a tooth? Name them in order.

1. The compression of the pericementum.
2. The resorption of alveolar tissue.
3. In many cases, the bending of the alveolar plate.
4. In certain movements the separation of the superior maxillae along the line of the suture.

Q.—Which of these occur in all instances?

The first and second.

Q.—Do these same changes occur in the rotation of a tooth?

Yes, but in rotation there is also a distinct stretching of the peri cementum at all points.

Q.—Is pain produced in the moving of a tooth?

In the direct movement of a tooth there is no pain and there will be none so long as the movement is continued within reasonable limits or while the tooth is held immovable.

Q.—What if the force be relaxed or discontinued?

There will then be soreness and pain.

Q.—Have we anything analagous to this in operative practice?

Yes, in the separation of teeth preparatory to filling.

Q.—After teeth have been moved will they remain in their new positions?

Yes, if held there for a sufficient length of time. If not held there long enough they will return to their former positions or nearly so.

Q.—Why do they not return after being held a long while?

Because new alveolar tissue has been formed which will hold them in their new positions.

Q.—How long a time is required for the formation and solidification of this new tissue?

Usually six months or longer.

Q.—Why so long a time, when the long bones, for instance after a fracture, unite in about six weeks?

Because in the case of a fractured bone nature provides a provisional callus in the medullary canal to assist in keeping the ends in a position, and in addition, the muscles exert their force in holding the parts together.

In the case of the moved tooth we do not have the assistance of the bony plug and muscular contraction, but instead, have the elasticity of the alveolar plate and the fibres of the pericementum both operating to force the tooth back into its former position.

Q.—Do pathologic results ever follow the movement of teeth?

Yes, we may have the devitalization of the pulp under too severe or too constant pressure.

Q.—At what age would such a misfortune be most likely to occur?

After maturity.

Q.—Why not earlier.

Because in early life the apical foramen is larger, due to incomplete calcification, and hence great constriction of the pulp is hardly possible.

Q.—How should force be applied in the movement of teeth if rapid movement is desired?

Considering the tooth as a lever, with the fulcrum near the alveolar border and the resistance along the apical third of the root, we should apply our force as far from the fulcrum as possible, that is, near the occlusal or incisal surface.

Q.—If we desired to use a tooth or several teeth as a means of resistance at what point should the power be applied?

As near the fulcrum as possible, or in other words, as near to the gingival margin as we conveniently can.

Q.—Is the opening of the median suture always a misfortune or is it sometimes desirable.

It may be either.

If we wish to enlarge the arch laterally, opening the suture is one of the best means of accomplishing it.

Q.—Is there always visible evidence of the opening of the suture?

Not along the line of the suture itself but it may be manifested by the separation of the central incisors or by the rapid gaining of space between the sides of the arch in the region of the molar teeth.

Q.—If you wish to expand the arch laterally would you apply your force to one tooth on each side?

No, for in that case these teeth alone would move. Force should be applied to several teeth on each side so that the teeth and alveolar ridges would move together.

Q.—In such case would you apply the force near the occlusal surfaces of the teeth or near the gingival margins?

Better apply it near the gingival margins to avoid tipping the teeth outwardly.

By questioning the students along some such lines as these I find I can bring out what the students know and especially whether they understand the underlying principles. I want to get them to think. They need to understand not only that a certain thing occurs but why it occurs. In this way they will become intelligent practitioners, otherwise they will be mere automatons. A proper system of questioning the students at intervals will show us their shortcomings or possibly their lack of comprehension and we can then correct it.

Teaching Operative Dentistry.

By C. N. Johnson, L.D.S., D.D.S., Chicago, Ill.

(Read by Dr. Stubblefield.)

In view of the scope of operative dentistry and the intimate relationship which this subject has with the everyday work of the practitioner it would seem essential that the student be thoroughly drilled in this branch from the beginning of the freshman year to the end of the senior year. In other words, there should be no part of his college course during which he is not getting some kind of instruction in operative dentistry.

It should start in the freshman year with operative technics, and the course in this should be very thorough. While it is impossible in a paper like the present to outline a full technic course, yet it may be said in passing that every operation to be performed in the mouth in ordinary practice should in some manner be carried out in the technic course. And it should be insisted upon that each student actually performs every operation without material assistance from others. To this end the instruction should be as largely as possible individual instead of class instruction. Of course, in the general laying out of the work and in certain of the fundamentals the teacher may lecture to the entire class, but for the most part the work in the technic room should be manual.

As one illustration of the practical application of technical work I might refer to the opening, cleansing and filling of pulp canals in natural teeth imbedded in plaster. This should be done not only with one tooth but with different kinds of teeth and with cavities located at different places in the teeth. Then the teeth should be removed from the plaster and filed to show the student how perfectly or otherwise he has succeeded. It is really a very difficult matter for the average beginner to locate and properly cleanse the canals of a molar, and unless he has had some previous technical training he will make a sorry effort of it when he first attempts it in the mouth.

This manipulation of the natural teeth, whether for the purpose of carving reproductions of them in ivory, or for preparing cavities or cleaning pulp canals in them, is a very important factor in familiarizing the student with the natural tooth forms, and the many peculiarities found among them. The actual handling of the teeth, the feeling of them and seeing them from every possible point of view, will impress their true anatomy upon the student's mind better than months of description. This should be the tenor of the work throughout the entire technical course—to compel the student to *do* things rather than listen to much description.

The fundamental fact should never be lost to view that lecturing upon technical processes to a class of students who have never seen these processes demonstrated is largely wasted energy. I am aware that this statement is diametrically opposed to most of the preconceived ideas on this subject. In fact I very well remember years ago to have heard one of our most prominent instructors make the statement that it was folly to start a class of students to doing any kind of an operation before they had received a complete course of lectures upon that subject. Looking back over many years of experience as a teacher I am almost prepared to state that it is greater folly to lecture to a class upon a series of technical processes which they have not at least attempted to perform.

To my mind the real value of a technical course in operative dentistry is not so much the manual training—important though this may be—as it is the placing of the student in such a mental attitude to operative procedures that he can follow a description of them and comprehend what is subsequently taught him in the lecture room. Take the difference in the degree of intelligence displayed by the classes of students in listening to lectures on operative dentistry—the one class a body of men who have never done any operating or who have not been well trained in practical operative technics, and the other a body who have been operating for some time. There is no comparison between them. The latter will grasp every point made in a lecture, and will ask questions to bring out collateral information in a way to warm the heart of the most phlegmatic teacher, while the former will follow the most vivid description only in a vague and unsatisfactory manner.

For this reason I am in favor of a very much wider application of the technic course for beginners in our college course. They should be required to do a greater variety of operations upon models or dummies, before they are prepared to listen intelligently to lectures, and they should pass directly from their technical work to operations upon patients. As most of the courses are now arranged considerable time elapses between the technical courses and practical work at the chair, during which period there is danger of the student forgetting much that has been taught him in the technic room.

In a three-year course such as that in force in most of the colleges at present the work in operative dentistry should be arranged something like the following: The operative technic work should be made to extend through the entire freshman year, even if only two or three half days per week were devoted to it. This should consist of the usual technic courses as followed in our colleges at present, with especial emphasis upon all of the mechanical processes to be performed afterwards upon our patients. The chief aim of the instructor should be to compel the student to *do things*, to manipulate instruments and study the fundamental mechanics involved in the various operations.

At the beginning of the junior year a short advanced technic course might be given in the insertion of filling materials in different classes of cavities in dummy models, and by the time this was accomplished the junior lecture course would be sufficiently advanced, and the student's mind in a sufficiently receptive mood, so that lectures and actual work upon patients could go along hand in hand to the best advantage of the student. The student should go directly from technic work to work in the mouth, and at first the operations upon patients should be under the closest supervision of the demonstrator. Demonstrating should be a prominent feature of the junior instruction in conjunction with a very thorough and complete course of lectures. The extent of junior operating need not be great but merely sufficient to keep the student in touch with the work and place him in a practical relation to the subject, so that he may more intelligently follow and profit by the lectures.

After such a lecture course during the junior year, and sufficient operating to wear off the awkward angles, the student is in good form at the beginning of the senior year to take up operating in real earnest, and attempt any of the difficult cases which are likely to occur in actual practice. From this time forward the demonstrating should be less, and the aim should be more and more to throw the student on his own responsibility and develop his individuality and judgment. The most fatal kind of teaching is that which outlines everything the student shall do and makes a mere automaton of him. The habit of relying on some one else to do his thinking for him is the worst the student can form and leaves him sadly handicapped when he goes out to practice. He should be made to take each patient assigned to him, and study the necessary plans of procedure, and when he has decided what should be done to the best of his ability he should report his decision to the demonstrator to have it verified or corrected. In this way he avoids making serious mistakes through lack of judgment, and at the same time develops his reasoning faculties so as to best equip him for the exigencies of actual practice.

During the whole senior course the professor should make close observations of the practical work of the students, and his senior lectures should consist largely of correcting mistakes he observes in such examinations. The entire operative staff should confer frequently as to the progress being made by each student, and the weak members of the class should be stimulated by a concentration of effort on the part of all the instructors.

In short, the instruction in this branch should be made as largely as possible selective and individual, rather than merely routine and class work.

Discussion.

Dr. J. H. Kennerley, St. Louis, Mo.

It is a hard matter for any man who has heard three distinct exposes of Dr. Guilford's ability to ask and answer questions to recover from the hypnotic effect. This is the third time that I have been hypnotized, and no man can take issue with him as to how to get the best results from the student. Dr. Johnson's paper goes into detail on the way he thinks his subject should be taught. His ideas are also mine. It is a question in my mind whether teachers do not rely too much upon didactic instruction and examinations. Even if you ask each question of a single man, you have benefited the whole class. If you ask these questions of different men, you still benefit the whole class, and, at the same time, you can discover whether these men are profiting from your instruction. The fact that we meet and exchange ideas is of value to each and every one of us. If we had more symposia and less paper we would be benefited more.

Dr. Chas. L. Babcock, Milwaukee, Wis.

I wish to thank Dr. Guilford for the very excellent exposition of his subject and method, and although I differ slightly from him as to the subject matter, I do not as to the manner of presenting it. The idea of getting students to give reasons for everything they do is a most excellent one. I do not limit myself to the oral quiz. I have a written quiz at least once a month, because sometimes students can talk around a subject and arrive at some sort of an answer, which, if put on paper, would be wrong. I also do that so as to give them exercise in expressing themselves in writing, following the old idea "That reading maketh a full man; talking a ready man, but writing an accurate man."

Dr. B. E. Lischer, St. Louis, Mo.

I, too, want to thank Dr. Guilford for his excellent exposition of this phase of the subject. I am glad of the fact that orthodontia has again been accorded a hearing before this body. In the December, 1904, number of Items of Interest, the editor speaks of a "new school of orthodontia." I wrote to Dr. Ottolenqui and told him I agreed with him that there was, for the "world of science as well as the social world, has its alternating seasons and its capricious fashions."

Now, regardless of whether we accept or deny all of the many tenets of this so-called "new school" it must be admitted to be the herald of another era, and so I suggest to your executive committee that they procure a paper or exhibit along these lines for our next meeting, for I am convinced we all would profit by it. I do not agree with some of the discussors of the president's address that the technical phases have been "thrashed out."

Dr. A. E. Webster,
Toronto, Can.

I wish to express my gratitude to Dr. Guilford for discussing this subject as he has. I might ask the question how many students are in his class, an important factor in the Socratic method. Can you entertain a large number by such a system of questioning. Of course, much depends on the teacher. Dr. Guilford may be able to entertain two hundred as readily as I can two students. There is no question that he is teaching. There is an old dictum in pedagogy, If you cannot teach, tell; and that is what we do in most cases. The lecturer on the rostrum tells; he does not teach. Dr. Guilford's method is the proper method of teaching; but can we do it? Have we the teachers to do it? Just after Dr. Guilford had begun with this question method, I thought it was developing a former lecture, and, then, at the latter portion of his hour, he would lecture on a new subject, beginning, again, at the next lecture with his recitation or Socratic method. That will overcome the difficulty, to some extent, for those of us who cannot entertain a large class. One thing that might help to hold attention is the blackboard. Students will then not only hear but also see, thus enabling them to call to their aid another sense. This part of orthodontia teaching is comparatively easy. But how do we teach it in the infirmary? Let me suggest a method in common use in the medical schools, and, I think, it can be used in the dental schools as well. Each student, or each pair, is required to have a case of orthondontia of his own in the infirmary. They have a week to look up the case, take models and study them. He makes a drawing of a method of treatment and we discuss it together. At the next meeting of the class this student comes before the class with his patient, models, photographs or skiagraphs. He makes a diagram of the case on the blackboard, and also of the appliances he intends to use. The models are examined by the whole class. Then he passes around with the patient and all the students examine the patient's teeth. I may ask him questions while he is doing this, or the students ask him questions. Then I ask questions of anybody about the case and the case is discussed thoroughly. When about completed, the case is presented again and the results are noted, and in that manner the class gets an object lesson that is not only interesting but extremely useful and practical. It develops thought.

Dr. W. G. Foster, Baltimore, Md. I would like to ask Dr. Webster what is the other fellow doing while this student is going around showing his case. It seems to me impossible to have a student show his case in such time that there is enough time left for discussion of the case with the whole class.

Dr. Webster. I have a smaller class than Dr. Guilford.

Dr. Ellison Hillyer, New York City. In regard to the quiz, it seems to me that it should be made a matter of habit with the student, and in order to carry out that idea it is a custom with us to quiz and also to examine in writing sections of fifteen or twenty in every class, beginning with the first year men and taking them through to graduation. This "quiz habit" soon becomes a second nature with the student. Our method of faculty quizzing was described in full at the last meeting of this association, and we feel satisfied with its success. If I should note a lack of interest during "quiz" I would ask those not interested to retire, or I would stop; I never have had to resort to the latter. As to examination, there are some men who can easily pass an oral examination but not a written one, and vice versa. I think we should give the student every opportunity to demonstrate in his own way what he knows and show wherein he is deficient.

Dr. H. E. Friesell, Pittsburg, Pa. I believe that the method of teaching outlined by Dr. Guilford is ideal for that particular subject. In fact, I do not see how we can teach some of our subjects any other way. Why do we teach? We want to convey something to those who have it not. We first explain and then to make an impression, we tell them why; otherwise they would have to depend entirely on their memories, and that, unless aided by reason, would not amount to anything. How do we know that we have made ourselves clear if we do not quiz? I prefer to quiz for ten or fifteen minutes at each lecture on the subject of the previous lecture, thus preparing them for the next step in the teaching. In the operative technic course have the student do what you tell him to do. Do not give the course without any explanation, but give him as much as his memory will hold, until he has the explanation. As to taking notes, many do not want their classes to take notes. That is wrong. I let my students take notes, but I tell them what to take notes on, the points that are made, and to which they must refer from time to time. By continual hammering you make those points their own.

Dr. Foster. I agree entirely with Dr. Guilford as to the matter of quizzing, but I question Dr. Webster's method of taking the patient around, interesting two or three men, and not knowing what the fellow in the other part of the room is doing.

Dr. D. R. Stubblefield, Nashville, Tenn. Dr. Johnson says that he commences with the student the day he enters college, and that he trains him in a certain direction, never letting up in his efforts until the student has passed out of the college with his degree. I think we must all admit that Dr. Johnson is correct in his ideas.

Dr. Guilford. What I gave you was simply an illustration of an occasional quiz. I do not quiz regularly, because if I did I could not go over the subject of my lecture. But we have quiz-masters who quiz regularly and continually through the session. They do what I would like to do if I had the time. But occasionally I desire to take the class in hand and find out how they stand; whether they appreciate what I have been trying to teach and whether they comprehend. Of course, these quizzes do not take the place of written examinations. There are virtues in both and it is our plan to combine the two methods wherever we can so that those who can express themselves most intelligently orally will have an opportunity of doing so, and those who can do it better in writing, can follow that method. During the quiz all of the students are on the qui vive to hear how someone answers the question. If it is answered wrongly it will be a lesson to the entire class. But the main point is to try and get the student to have an intelligent idea of what they are studying and to have them comprehend it. The man who lectures can do a certain amount of good. He can teach principles there and do it there and nowhere else. That is the province of the didactic teacher. But in addition to that he must have the practical training, providing it is a practical branch. I believe that in the future teaching will be less didactic and more demonstrative. We can take a model and demonstrate the preparation of a cavity or its filling, but it is not until the students come to do it that we really know whether they understand and comprehend what we have shown them. The good demonstrator will, in the future, be a more valuable man than the good lecturer. We are all trying to do the greatest amount of good, and we come here to compare notes and see how we can improve in this or that direction.

A Practical Course in Soldering.

By Ellison Hillyer, D.D.S., New York, N.Y.

The old adage that "Poets are born, not made" seems to be generally accepted as true. If such be the case, the skilful metal worker is a not-distant relative to the poet. Indeed, the poetry of fine art finds a fit exemplification in the technic of a thoroughly trained workman who can by his ability change crudity into beauty and in the process of manipulation introduce ease of movement, deftness of touch, quickness of perception, and exercise of forethought. Of such there are, I regret to say, but few among dental students, even at graduation. I leave it to your own judgment to calculate the number among the ranks of the profession at large.

Some students can be told a thing, and comprehending at once intelligently follow instructions; for others it is not only necessary to explain a proceeding, but it must be followed by a demonstration; seeing the thing done seems to fulfill the requirements in such cases. Still others need, added to the foregoing, to perform the task before full comprehension dawns. *But the remainder!* You explain, demonstrate and demand a term of practice and yet the results are unsatisfactory.

There is a sphere, no doubt, for everyone in this world; how often we fervently wish we might be able to find the proper niches for our dental student failures and consign them there.

No one subject seems to be more difficult to impart to the student body than the art of soldiering. I term it "art" advisedly, for no artist with his pencil can create more beautiful results than can the manipulator of a properly graded blow-pipe flame in directing and guiding the flow of solder. The ability to make it go wherever the will directs; to use both hands in the most minute operations and eventually produce the object sought.

While individual instruction, outside of lecture and demonstration has been given our students at New York College of Dentistry upon every practice and practical case, the results up to three years ago did not give us the full measure of satisfaction that we desired. Several state boards require a practical demonstration of a student's ability to solder. In New York it takes the form of what we term a "backed and soldered case"; i.e., a full upper coin silver plate, carrying single gum section teeth, backed with coin silver, invested ready to solder. This test seems to fulfill the maximum requirements of the examiner and present the greatest number of difficulties for the student. If he can perform this test in a creditable manner, he is in a position to intelligently undertake less difficult tasks.

Two years ago, under the direction of one of our instructors, Dr. G. A. Manney, to whom much credit is due, we initiated a special requirement of the senior class to prepare them especially for the test of soldering. The plan of this course I showed at Buffalo last year. Originally, the course called for the cutting out by the student of a blank in the form of a full upper plate prior to swedging. (Fig. 1.)

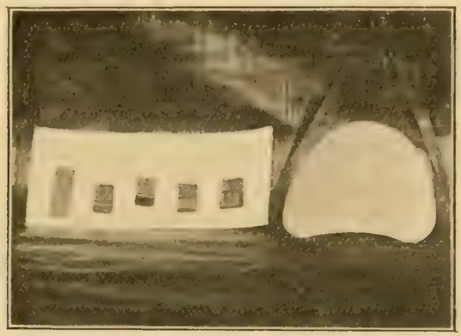

Fig. 2. Fig. 1.

Fourteen pieces of metal the width of an ordinary tooth backing and twice as long, were then cut out and bent in the form you see here. (Fig. 2, showing the five steps in preparing each backing.)

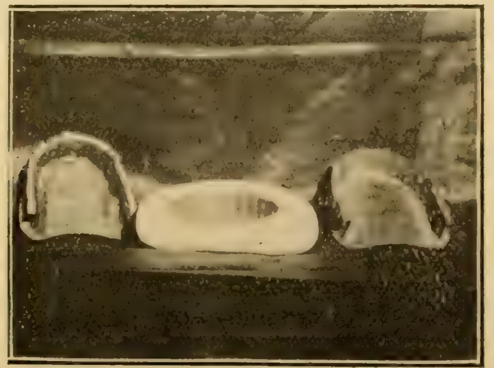

Fig. 3. Fig. 4. Fig. 5.

By means of the loop punch the similitude of the tooth pins in position upon the backing was obtained. The blackings were then adjusted to the plate in a manner similar to the teeth positions (Fig. 3), invested (Fig. 4) and soldered (Fig. 5).

Each student was required to prepare and solder at least two specimens before the instructor, and in the event of failure to qualify, to repeat the operation till successful.

The results were more than pleasing. Even the state board examiner extended his congratulations upon the results of the succeeding board examinations. I would not have you think that our only object was to prepare the student for that particular examination but to perfect him as much as possible for all subsequent work of that character.

Following up the advantage thus gained we have transferred the course into the first-year class, so that now the student, before he takes up any plate work whatever, receives his initiation into this particular mystery with thus far gratifying results.

Furthermore, we have improved the crude original by having stamped out by a manufacturer a plate and the backings similar to the actual ones in shape and cóntour. (Figs. 6 and 8.)

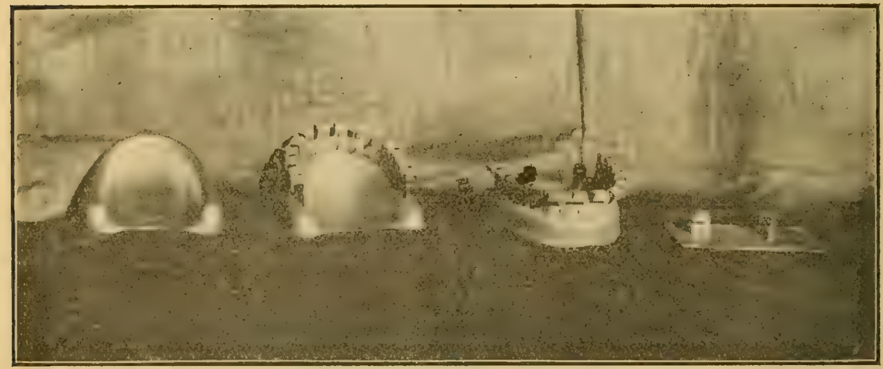

Fig. 6. Fig. 7. Fig. 8.

These require only the assembling in position (Fig. 7) by the student (making a saving of time), investing and soldering.

The instructor gives the preliminary information regarding the metals and their peculiarities; the blow-pipe and bellows and their proper manipulations; the solder and its idiosyncrasies, and then performs the whole operation before a class of twenty. Each student is required to complete two cases, one in copper and one in German silver, and two investments, one in plaster and sand, and one in plaster and asbestos, thus meeting slight changes in conditions.

My object in presenting this before you is two-fold; whatever of value in the course may appeal to you is yours to use at will; some I know are using parts of it from comments heard at Buffalo last year. On the other hand, if you can suggest an improvement in any direction we would feel more than repaid for any effort expended.

Discussion.

Dr. G. H. Wilson, Cleveland, Ohio.

Mr. President and Gentlemen.—Only words of commendation should be said of this paper of Dr. Hillyer's. It is concise and deals in a very practical manner with a condition but not a necessity in dental education. The doctor has very happily classified our students. I would suggest that the one-two-three order, that is, one-sixth, two-sixths or one-third and three-sixths or one-half will approximate the number in each class. It is this under-high-grade half of the class of students that taxes the ingenuity and causes the anxiety of the teacher, and makes necessary the examining boards. They are like the poor, always with us. I agree with the inference to be deducted from the statements of the essayist that this half of the class are deficient in the qualities that go to make the brilliant dental student. They do not well grasp ideas, cannot well improvise methods, but after much patient repetition they become reasonably proficient, but like the machine which they resemble, they must continue to reproduce the thing for which they are perfected: they cannot adapt the involved principle to a new use. If we accept this statement as a fact it logically follows that this class of students should be taught only such things as they are to make use of in actual practice. It seems to be thought that because of the expense of gold it is necessary to do the technic work in brass and German silver. I trust the time will soon come when our schools will be equipped with metallurgical laboratories, and the students required to do all technic work with precious metals, which must be refined and alloyed for further use. Thirty dollars' worth of pure gold or coin gold for each student would be ample for the entire course. The student should be required to account for the full amount of gold less a certain per cent. which experience will demonstrate is necessary waste. The object sought is not to teach the student to solder brass, German silver and silver, but to solder gold. The reason we now employ the indirect method is the supposed expense. When the schools are properly equipped the ultimate expense should not exceed five or six dollars per student and the results incalculably greater. The essayist almost apologizes for preparing the student for the state board. His motive in using this method of teaching should not be questioned. It is imperative that the schools prepare the students to successfully meet the demands made upon them, no matter whether it is by a state board or conducting a private practice. The writer of this discussion firmly believes in the necessity and utility of the state boards, but it seems to the writer that there should be a mutual understanding between the faculties' and examiners' associations. Regarding the question of soldering and kindred subjects the examiner should satisfy himself of the results of the pupilage, but not the method of instruction. The examiner has no right to declare that the examinee cannot successfully work gold because he cannot well work silver, brass or German silver. Many of our older men, who are fine workers of gold, could not do themselves credit with the baser metals. Much has been said of late about the time required for educating dentists; while this is important, it is more important that the best use should be made of the time assigned, and not an unnecessary hour taken from a man's business life. The writer cannot understand how any conscientious practitioner with only a moderate conception of hygiene and aesthetics can recommend the use of a full denture of soldered gold, for in continuous gum work we have that which is immeasurably superior and no more expensive. The time necessary for the dull student to learn to properly construct a denture of this kind is very great and robs the student of valuable time needed for other work. It is to be hoped some action may be taken by this society towards having this obsolete method removed as a requirement of some of the state boards. The writer does not wish to be understood as decrying modern soldered gold plate work. To-day a properly soldered gold plate should be made of plain teeth, backed, contoured and soldered to the plate after the principles employed in the highest grade bridge work. So long as this method of work shall be required by some of our state boards, the technic described by the essayist is most admirable. At a moderate expense it saves the student much valuable time, and certainly teaches them this kind of soldering. Another most valuable feature about the method is that the dull students for whom it is expressly designed will not be impressed with the relation between it and the practical work for the mouth. With regrets that I cannot be with you to enjoy this meeting, I assure you that my heart is with you, and wishing you the season's blessings.

Dr. J. H. Sherwood, Buffalo, N.Y.

I want to congratulate Dr. Hillyer on his excellent paper. He says soldering is an art, and it is. Nowhere is the statement what to do and how to do it better applicable than here. The student must have a knowledge of every detail of the work, and he must have digital dexterity to put that detail into practice. I have found that it takes a great deal of precept and lecturing, example and demonstration to get students to acquire this art of soldering. Dr. Guilford said yesterday that the teaching of the future would be done by demonstrators rather than by lecturers. A good combination is the man who can lecture eloquently and who can demonstrate efficiently. I have found it difficult to impart digital dexterity to the student. Invariably students will stand up to do this work, and the consequence is that they are constantly moving and disturb their work. I have made it a rule to teach the students to sit down to solder and to hold the blow-pipe with the left hand. I find that they can do that while in a sitting position with much more precision than they can hold the pliers in the left hand. In our school we have the same work Dr. Hillyer has mentioned in that we have the details of the work taught from the freshman year on. Every freshman makes a two-tooth plate on German silver so that they can get the technic of soldering. In the next year we give them something more difficult, a full plate made on a base of German silver with silver solder, using plain teeth. I like the combination of using teeth with the technic of soldering, and I differ from Dr. Hillyer in that respect only. The technic he has brought out is very good, but the student, if he does that, loses the combination of taking care of porcelain teeth while he is doing the soldering. We think it better to have the student use the plain teeth, solder them on a base of German silver and thus get all the points brought out in the heating and cooling which are necessary for that work.

Dr. S. H. Guilford,
Philadelphia, Pa.

I feel that I can scarcely commend this work sufficiently highly. I became familiar with it a year ago at Buffalo, and it impressed me very favorably. It seems to me that when we require the student to construct a full plate, we are demanding the performance of a very difficult operation, and the question has often arisen whether it would not be better to find some other test of the student's ability not quite so hard as this. I have not been able to find a substitute for it; neither has anyone else, but Dr. Hillyer's plan is a step in the right direction. The student is afraid of soldering his case because of the danger of cracking the teeth. This removes one of the difficulties. It gives the student all the preliminary practice he needs, and after that he can centre his mind on some other point. In our school the freshman student has, as the culminating point of his work, the making of a swedged metal plate. In the second year, a full soldered plate of gum teeth. In the third year, he has a practical metal plate made for a patient and fitted in the mouth. It is a matter of progression to develop the student's ability, and with Dr. Hillyer's preliminary it seems to me we have something that will simplify the student's work a great deal. In regard to soldering, let me make one suggestion. Until recently we did not have compressed air in our laboratories. We introduced it, and the students can now properly regulate their work; they can solder with twice the ease that they could before. As for the state boards, that is an important thing, because in many cases they require the soldering of a full upper denture before they will examine the student. It is difficult to do that, especially when someone is watching or if it is done where one is not familiar with the surroundings. Students often bring plates to me in which I find that a tooth is too short or too long or not quite in the right position, or possibly, they have cracked one or two of the teeth. I tell them to remedy the faults, and any accident that occurs in the second soldering I will overlook because it is liable to happen to anyone. Nor do I require a full set, but I do require that the teeth be set up correctly and that the soldering is done properly.

Dr. W. M. Bartlett,
St. Louis, Mo.

The subject of soldering and the handling of the blow-pipe is one of the most important in prosthetic dentistry. The failures made by many students and practiontioners are the results of not thoroughly understanding the use of the blow-pipe. The first thing to teach the student is the construction of the blow-pipe; the advantage of one blow-pipe over another; the advantage of the stationary blow-pipe over the hand blow-pipe. The advantage of compressed air over air propelled by the bellows or the lungs. After this has been accomplished the next step is to teach the effect of a flame on the different metals to be used; the effects of a flux on the metal, and why the flux is used. I was very much surprised at a state meeting to hear a gentleman say that the flux was used as a kind of grease so that the solder would run. Many practitioners believe that to be true. The student should be given an understanding of the effect of heat on the various metals in order to teach him that there is a time for the flowing of the solder, and that conditions should be right for this time. We know that when heat is thrown on silver it fuses with startling suddenness. Gold sweats and warns you that it is melting. These things should be taught the student. Next the principles of soldering should be taught. What is necessary for good soldering? Clean surfaces, thorough contact, etc. The next step in the course is the uniting of metals by the sweating process. By this time he is familiar with the use of the blow-pipe, the metals used, the conditions these metals should be in, the necessary flame and heat required for fusing and the flowing of solder. Then you can give the student a further course so far as soldering itself is concerned. I believe, however, that the principles we are aiming at are lost in this technic course. We must also teach the student how to solder a metal lining to a porcelain surface. We must teach him that there is expansion during the investing period of the base; that there is contraction of the mass during the cooling; consequently we must teach him how to place his backings upon the porcelain, and how to allow for contraction. These things are necessary in a course on soldering. In our school we give a soldering technic course. Dr. Wilson says it is necessary that the student should use the metals used in practice. I will say this, that any man who can solder a brass plate can easily solder a gold plate. All we want to do is to give the student the idea.

Dr. J. D. Patterson, Kansas, City, Mo.

This is a very admirable presentation, and Dr. Hillyer deserves our compliments. We have not been taught much about soldering in recent years. The old practitioner was more adept at that than the bridge worker of to-day. It seems to me that use of the mouth blow-pipe should also be taught. I cannot get away from that idea, and, I presume, you will think me old-fashioned. I have used many kinds of mechanical blow-pipes, and when I am in the midst of soldering a considerable piece of bridge work something may give way. What would the average dentist do in that case? He would have to let his case get cold; have his bellows mended, and do the work over again. On the other hand, it is a simple matter with my mouth blow-pipe to keep up the work and finish it without accident. I have found myself in that predicament, and I know others have too, and have been delayed for half a day because they knew nothing about the mouth blow-pipe. I use the mouth blow-pipe for the finest soldering, and it is of great use to me. It should be taught to the students. It can be without a great expenditure of time. In regard to the models passed around, there is, at least twice too much investment. If I should take either of these cases, I would form a cup out of copper plate, the old-fashioned way, and make it fit closely and use less than one-half as much investment. That is a great advantage in heating the copper cup. The old practitioners used it to protect their plate from warpage. It is excellent. The soldering technic ought to include methods of heating up a case. I go into the dental laboratories and criticise methods of heating up because they have too much uneven heating, and in any considerable case I resort to the charcoal stove. There is no way by which the heating up can be controlled so easily and effectively as by the use of the charcoal stove. The same is true of the cooling down. The contraction and danger of fracturing teeth is reduced to a minimum because of the effectiveness of this old-fashioned method.

Dr. Ed. M. Kettig, Louisville, Ky.

I want to enter a plea for greater advancement along the line of teaching dental students mechanic dentistry. We are too old-fashioned in that, and I am sorry to hear the remarks of Dr. Patterson. If we teach our students these old-fashioned methods of doing this work, there will never be much advancement in prosthetic dentistry. Unless we can inculcate newer ideas, mechanical dentistry will be still further back than it is now. Our methods must be in advance and not in retrogression. A full soldered case should not be adopted in the schools nor at state board examinations. Not many of you would think of making a full soldered case in your own practice. You should not ask your students to do that which you yourself would not undertake to do. The art of soldering has been advanced markedly by the demands for all kinds of bridge work, and now that orthodontia has come to the front and revolutionized former methods of regulating teeth, beautiful and careful soldering is an absolute necessity. If we would teach more modern ways of investing work and leading up to the soldering, it would be a good step in advance. Many of the materials students are taught to use are below the standard; such, for instance, as the flux they buy. It is entirely unfit for this work. The jeweler would not think of using the borax for flux that is supplied by the dental supply houses. He uses a better grade of borax, the crystals, and not the little stick of borax which must be pulverized for use. With such a flux the solder does not willingly flow right. The man who is an expert in soldering does not use that kind of material nor does he use such an investment as plaster and sand.

Dr. Hart J. Goslee, Chicago, Ill.

I am very glad that this practical subject has been brought before the Institute at this time, and wish to compliment the essayist on his admirable presentation. I agree with Dr. Kettig in his plea for advancement along these lines, and believe that we are getting away, to a large extent, from the construction of metal dentures. Therefore, in order that the student may have the subject presented in the best possible manner, I believe that a course similar to the one outlined by Dr. Hillyer is an admirable thing. We would not, however, construct a full soldered denture at the present time. If this is true why should we require our students to do it, and why should our state boards require applicants to do something which is not practical? In the construction of dentures of this kind the same technique along a far more practical line, would obtain if the student would simply use plain teeth attached with solder and a pink vulcanite gum. We should teach the student to do only that which will be required of him in practice, and the more practical we make the work, the better it will be for the student. Along this line it is the custom of many teachers to allow their students to make dentures, crowns and bridges of German silver, a procedure to which I object. There is absolutely no similarity between the working properties of German silver and gold, and I have always required the student to do his technic work with a metal which resembles as closely as possible that which he would use for practical cases. As we have nothing better than brass as a substitute for gold at the present time, I compel them to use brass in all work where gold would be indicated for practical cases. In cases where platinum would be used for practical purposes, however, I allow them to use German silver because of its high fusibility. Dr. Patterson mentioned the use of the blowpipe. Along this line I appreciate his remarks very much, because, as a rule, students are not properly taught how to successfully manipulate a blow-pipe, which is due largely to the fact that they begin with and are allowed to use the bellows. To my knowledge there is not a bellows used in our college. Every student is taught how to use the mouth blow-pipe, and I am sure that he can do far better work than if he had been allowed to begin by manipulating the blow-pipe with the bellows. They can soon learn how to blow a continuous flame and keep it up as long as is necessary. The question of heat, so far as the blow-pipe is concerned, is largely overestimated. Students should be taught that they must bring the temperature of the object to be soldered up to pretty near the fusing point of the solder before they begin to manipulate the blow-pipe, and then but little heat from the blow-pipe is required if it be properly directed.

Dr. B. N. Pippin,
St. Louis, Mo.

The teaching of prosthetic technic is by no means an easy task. There is probably nothing in the technic course which is more difficult for students than the approximation of porcelain teeth to metallic bases and attaching them thereto by soldering. Therefore, I wish to commend Dr. Hillyer's method of teaching students to approximate metallic substances to be united by solder, without any facings, before attempting to teach them to solder facings to metallic bases. I might suggest that before making a full denture, the class be taught to solder two or three teeth as in a partial denture; on account of being enabled to make a smaller investment and the process of soldering be more simple than in the full denture. In the case of some of the metals that oxidize readily, the flux assumes a greasy appearance and the solder will, in the language of a student, "Ball up and grin at you." If they learn to flow solder on a metal of this character, they will have no difficulty in soldering when porcelain is added. They will not be as liable to break their facings because they will have learned the required temperature for fusing the solder, the proper size of investment and the means of applying the flux. I do not quite understand whether Dr. Hillyer performs the experiments before his class or whether he uses models of ready finished work. Students learn much more when they see an experiment performed than when they are told how it was done. My method is to demonstrate each any every exercise, step by step, by actually performing the experiment before the class. I wish to commend Dr. Hillyer's paper to all teachers of prosthetic technic.

Dr. Geo. W. Cook,
Chicago, Ill.

Dr. Patterson and Dr. Goslee brought up a very important question in connection with soldering with a blow-pipe. Some seem to think that soldering a case with a mouth blow-pipe is a very difficult thing to do. I have seen Dr. Haskell, of Chicago, solder a continuous gum set of teeth with pure gold on platinum with perfect ease with a mouth blow-pipe, and do it more quickly than I have ever seen anyone do it with the bellows. When I have delicate soldering to do, I invariably resort to the mouth blow-pipe, and when I used it continuously, I had a greater lung capacity than I have now.

Dr. Hillyer. I offer no apology for this particular case. There is no question about the plate itself. The state boards demand it. It is as obsolete as the flood, but is supposed to contain the *greatest number of difficulties;* the task of selecting a proper test for an applicant is a hard one because the applicants come from all sections and from various schools. In regard to the digital dexterity, of which Dr. Sherwood spoke, I do not care whether the right or the left hand is used for holding the blow-pipe. The Macomber blow-pipe is really preferable, because it gives one the use of both hands. Sitting down or standing up makes no difference whatever. As to the use of compressed air, is it wise that the student should be confined to that? A large proportion of students will not have compressed air when they start out to practise. I left out the teaching of the use of the mouth blow-pipe in this particular course because we consider the other better; this does not imply that we do not teach its use; we do in other classes. If a student takes the proper precaution to see that his apparatus is in proper order before using it, as he should, there would be no necessity for stopping work because of a break in the tubing or bellows. There is no lack of continuity in flame when proper apparatus is used. As to what Dr. Pippin said, I stated distinctly that "the instructor gives all the preliminary details before the class." It is extremely pleasant to hear so many commendatory remarks upon this presentation of the subject, but the credit of the results is due to Dr. G. A. Manney, who is in charge of the class, and I do not desire to claim any special credit, except as being the means of bringing it before you.

A Few Important Features in Teaching Bacteriology and Pathology to Dental Students.

By Geo. W. Cook, B.S., D.D.S., Chicago, Ill.

It has been more than eighty generations since the dawn of scientific thought, and from that time up to the present there has been accumulation of both theoretical and practical knowledge. When an application of the sciences is made to the healing art it, as a rule, conveys a wide range of synonym. It was difficult for old school theorists to think of this application otherwise than something pertaining to the curative treatment. They overlooked the fact that purely scientific subjects were inseparable from that of disease.

To trace the logical connection between the purely scientific doctrine of disease or pathology with its various biological phenomena to that part of the healing art known as dentistry, is now a possibility. In the oral cavity there are certain innate tendencies which exhibit a definite series of morpohological and physiological phenomenon, which constitutes the organization of some of the important biological processes that takes place in the body as a whole. And so long as these various phenomena remain active in the oral cavity, it will always be subject matter for biological study.

It must be remembered that when the conditions are extensive enough to disturb the normal cycle of vital phenomena, certain structural and functional changes will make their appearance, which is an indication that the mutual adjustment of the tissue and their functional activities are no longer preserved.

It is important to note that the deviation of the oral cavity from its typical normal function may take place without having any noticeable influence in the general well being of the individual. On the other hand, these changes may be of such a nature as to interfere with the physiological activities of the body as a whole, or even to involve many destructive changes in the local tissue.

.It must be borne in mind that no sharp and well defined line of demarcation can be drawn between certain structural changes that takes place in the tissue, and certain functional activities that manifest themselves in certain protoplasm.

Pathology, like all the inductive sciences, has, up to within a short period, been taught as natural history. But since physics and chemistry have been so intimately associated with the science of physiology, pathology is becoming more and more looked upon as truly a biological science; and any deviation from the normal processes must to a greater or lesser degree involve the physical and chemical elements that go to make up the phenomena of life.

Since dental education must involve many of the purely scientific subjects, such as anatomy, histology, chemistry, physiology, and more or less of physics, and has to do with many changes that take place in the body as a whole, and especially deal with certain local disturbances that we designate as pathological, the question naturally arises: In what manner and to what extent can these pathological changes be best interpreted to the dental student?

Since it is recognized that all organic substances are built up out of the elements or simple chemical compounds, it is important that a dental student should become familiar with the anatomical as well as the histological structure of the living body, with a thorough knowledge of its functional activities. Since bacteriology has become one of the leading factors in the causation of certain structural and functional changes that are constantly manifesting themselves in certain abnormal processes, it is important that the principle of this subject be well fixed in the student's mind before he enters upon the study of this very complex and important subject designated as pathology.

Bacteriology is one of the fundamental sciences that involves fermentation, putrefaction and disease, any one or all of the conditions may take place in both organic or inorganic substances. The physiological activities of bacteria must necessarily be performed under nearly all circumstances, the result of which there is formed a large number of intermediate and end-products, any one or all of which may be formed in any of the above-named processes.

The study of fermentation is of the greatest importance to us as dentists. With our present understanding of the phenomena of tooth-decay, there is involved one of the most complex chemical reactions known to biological science. Taking into consideration as it does the breaking up of the rasemic and strio-isomeric bodies, which are double compounds consisting of an equal number of dextro-rotary and levlo-rotary molecules, which are either found in the oral cavity as a physiological solution, or they may have been conveyed into the oral cavity as food-stuff and become dissolved by the saliva, forming suitable pabulum for bacteria, which eventually produce a product which may cause caries of the teeth.

The study of bacteriology and pathology can only be of value when the physiological processes of bacteria are comprehensively understood. The study of forms and the classification of bacteria by their morphological differentiation, is not of great value without an understanding of what they produce and what changes may take place in certain envioronment. The researches in bacteriology have fully demonstrated that some bacteria grow more prolific than others, and produce certain marked chemical changes in their environing substances, especially if the chemical molecule of the environing substances contain a certain definite number of atoms.

If a practical application of bacteriology is to be made to the study and practice of dentistry, it is essential that an understanding be had of the various phases of the chemical processes which take place in the transformation of living matter into non-living substances and vice versa. A sufficient study to comprehend these various phases would comprise a consideration of the various substances that are usually designated as bacterial food-stuffs. The chemical changes which are ordinarily involved in the transforming of non-living matter into living protoplasmia, has been found to be quantitatively the same as for other forms of life.

The chemically building up of the living organism seems to be accomplished by a sort of doubling up, as it were, of the simpler compounds into the more complexed substances (synthesis). Through this building up process there is obtained a great variety of complex organic compounds, the analysis of which has not been fully worked out.

Koch rendered great service to the science of bacteriology when he invented the method of pure culture of bacteria, by which means it is possible to isolate the colonies which originate from a single germ, and in this manner obtain a single bacterium from the admixture of others. He also established a principle in cellular physiology that opened up a vast uncultivated field for the benefit of that science. His principle has rendered a great benefit to the technical mycology of fermentation and putrefaction, as well as to the pure science of physiology. It must be borne in mind that these discoveries established a dogmatic pathlogy, which was to the effect that bacteria was the true and only cause of disease. While it is true that pure cultures when reared under perfectly similar condition, will produce the same morphological forms with the same physiological action, still later investigations demonstrated that these same bacteria transferred into substances which though differing slightly in its chemical constituents, would change their morphological as well as their physiological activities, a condition which is not only true of bacteria but which is proven to be true in the multicellular forms of life. It is now known that bacteria are only one of the main factors in the structural and functional changes that takes place in the higher forms of life, as well perhaps as in some of the very lowest forms.

After twenty years of research and study Koch changed his mind upon this subject, with reference to the transmissibility of tuberculosis from one specie of animal to that of the other, thus showing that his original conception of the variability of the pathogenic properties of the tubercular bacilli was greater than he at first thought; because in his three rules for the determination of disease producing organisms he emphatically states, that in order to establish the relationship of bacteria to disease they must be found in the body of the diseased animal in sufficient quantity to fully establish its identity; secondly, that they must be artificially cultivated, and thirdly, inoculated into susceptible animals and the disease reproduced. These rules he claimed were necessary in order to establish a disease process due to the action of a given microorganism. But it is a pathological fact, pretty well established, that there are many diseases in which it is impossible to obtain either pure cultures or reproduce the disease in other animals, when we know defenietely that the disease has been primarily caused by a specific germ.

With the above conceptions before us as to the pathological nature of the disease, and with the prominent factors of certain innate tendencies of immunity or predisposition to disease, the question arises: What are the essentials in the study of bacteriology to that branch of the healing art known as dentistry? The dental profession has to deal with a certain phase of pathology for the alleviation of pain and cure of disease, which is known as dental caries. This particular pathological process is apparently but little found in the higher civilization of man. Therefore, since it is one of the common pathological lesions that the dentist is called upon to treat, it is then necessary that the best information upon this subject and the interpretation of the biological phenomena that are constantly present in this process, should be interpreted to the dental student during his college career; and unless such interpretations can be made systematically and with a broad conception of the fundamental principles underlying such process, his treatment will be empirical and without the essential features necessary for the prevention of decay.

It has previously been stated that some understanding of fermentation should be included in the course of bacteriology and pathology, because of the intimate relation of fermentation to dental caries, as understood at the present time. I do not deem it wisdom for a student to have ground into him the entire role played by bacteria in distilling and brewing the preparation of wine, vinegar, etc., but there should be placed before him such knowledge as might possibly lead him to a better understanding of the processes that are constantly manifesting themselves in the oral cavity, and especially should he have an understanding of the cause of dental caries. The argument is frequently made that the part of pathology pertaining to tooth decay can be taught by the chair of operative dentistry, and that part pertaining to tissue changes can be taught by anyone who has obtained a little knowledge of the formation of pus, and incidentally has seen under the miscroscope a few of the bacteria that are commonly present in the causation of such tissue changes. This part of the subject of pathology is usually placed in the hands of a recent medical graduate. He, as a rule, gives a few lectures on the subject, stating to the class that he considers it of no special importance to the dental student.

If the science of bacteriology and pathology is worth anything to the practitioner of dentistry, it is worth everything. Therefore, bacteriology and pathology should only be taught by individuals who are devoting all of their time to the teaching of such subjects, and only by such persons, then, who have gone into the subject sufficient to have made a thorough study of its relations to the teeth and oral cavity, but better still for an individual who is practicing dentistry half of his time and the rest of which he gives to his subject in both the laboratory and infirmary.

During the student's course he should learn to prepare the different kinds of culture media, with an understanding of the chemical nature of each food-stuff and how certain forms of bacteria change these food materials, so as to cause the disintegration of tooth substance as well as destructive changes in the soft tissue. He should make a comparative study of the action of these bacteria in saliva or solutions containing, as nearly as possible, the various chemical constituents of saliva, thus familiarizing himself with the biological phenomena of tooth decay, with some understanding of the factors that enter into this process. But this cannot well be accomplished by the student unless his training in physiology has been of such a nature that he is somewhat acquainted with the physical and chemical changes that normally take place in the higher forms of animal life.

In the institution that I have the honor of being connected with, the course in bacteriology and pathology is laid out on broad, simple lines, but I am sorry to say cannot always be fully carried out. The junior class devotes two half days a week in lectures, laboratory work and recitations on bacteriology and pathology. They are made familiar with the preparation of various culture media used in ordinary laboratory work, with a thorough understanding of the advantages of proteids, carbohydrates and fats, with instructions as to the most important part that the inorganic salts play in the physical world with relations to living substance. They are then made familiar with bacterial growths as cultivated in artificial media, and the means of identification of bacteria by isolation. Inoculations are then made into animals and their pathological effects studied. They are also shown the various processes of artificial tooth decay, with a study of some of the bacteria constantly present in the oral cavity. They are made to study some of the phases of fermentation and disease, etc. During this course immunity of the body, and especially that of the oral cavity, and the virulency of the non-pathogenic properties of bacteria are discussed, with reference to intercellular bacterial toxines and those poisons that are classed as ptomains.

All my efforts are directed in as simple a manner as possible. The relationship of physiology to the decomposition of organic substance with the production of certain chemical ferments or enzymes is now taught, and while dealing with this phase of the subject animals are injected with certain intercellular toxines; demonstrating the action of some of those alkaloidial-like chemical agents, which play such an important role in the pathological changes that manifest themselves in certain forms in the destruction of the peridental membrane.

The future advancement in dental pathology and bacteriology will have to come very largely through investigations on the physical and chemical changes which take place in cell nutrition, with reference to cellular toxines.

The microscopic examination of tissue for the determination of certain pathological changes that take place therein, is one of the most difficult parts in the instruction of dental students along pathological lines. The reason for this can only be accounted for in the lack of sufficient knowledge in the normal structure and function of tissue. The students are capable of interpreting these microscopical substances and are incapable of reasoning upon the simplest problems in micro-biological thought.

The study of science with its relations to applied science is frequently looked upon by the majority of the profession, and more especially by the students just entering the college, as a subject almost beyond the comprehension of the majority of people. The phraseology of science is often exacting, and to the individual not accustomed to exact methods of thinking is not easily comprehended, and less easily applied. This is due largely to the lack of the true meaning of many of our scientific terms, when interpreted in the terms of pathology or disease. The term agglutinin, used so often in pathological literature, to many is a meaningless word, but to the pathologists it is a term to designate some substance which will cause the clumping of blood cells or bacteria, and is applied to disease. It designates some specific substance formed in the body by the introduction of some specific germ, which primarily generated the substance. Therefore, the term is used to designate a purely scientific fact, and secondly, to designate and interpret certain facts relating to the theories of immunity and antitoxine. This will illustrate a clear understanding of certain terms applied to pure science, and their meaning when used in the interpretation of applied science. But, as has previously been stated, a great deal depends upon the qualification of the instructor. It has been said that it is easy to make a good speech when one has a good subject. So it is easy for the instructor to make his interpretations clear on scientific facts when he has a clear and well-defined understanding of these facts himself.

The above illustration means everything to the subject. It means first of all that the instructor has observed all the phenomena in nature. So the student and instructor have this store of facts in common, but the instructor must assist the student to apply the little everyday phenomena to the interpretation of the more complex phenomena of nature. For example: Every schoolboy knows that when he gets cold he shivers, and if he has room enough he will run, slap his hands and stamp his feet. But one might ask what has this to do with getting warm? The instructor should know that muscular contraction generates heat (about eight-tenths of the energy used in contracting muscle is liberated as heat), and the cold applied to the body stimulates the sensory nerve endings of the skin; this stimulant is carried to the cord, reflected back to the skeletal muscles along the motor nerves, causing them to quiver and contract and thus generate heat. This simply illustrates a method of interpreting observed phenomena, in simple terms.

Another simple illustration in fermentation is the agglutinated mass of substance found in fermentation of acetic acid or vinegar, which is ordinarily spoken of as "the mother of vinegar," which is the accumulation of a form of plant life capable of bringing about certain chemical changes in their environing fluid, provided this fluid contains the necessary chemical constituents, not only to produce acetic acid but certain forms of alcohol.

In conclusion, I must say, if our books on special subjects were modeled after these simple forms ranging from the well known to the imperfectly known and unto the unknown, it would save students much valuable time and direct them in a way which will lead to a definite conclusion. Then the students would soon begin to awaken and at the same time develop reasoning power whereby he could make practical use of the biological knowledge as used in applied science.

Discussion.

Dr. Fred. C. Zapfee,
Chicago, Ill.

The dental profession is agreed that the dental student should be taught pathology. The problem before us, however, is how should it be taught, how much should be taught, and by whom should it be taught. Pathology is the basis of all treatment; without it treatment is empirical; with it treatment is simple and rational. Unfortunately, however, pathology, like histology, physiology and kindred subjects is looked upon by the dental student and the dental practitioner as being a medical subject, by which is meant those biologic subjects that have been given a place in the medical curriculum; subjects which are as much dental as they are medical. Nevertheless, the dental student bristles with opposition when he enters upon the study of these subjects and, hence, he deprives himself of much that is of value and of material aid in the practice of dentistry. But the fault is not all his. He comes by his dislikes honestly. I have heard some of the most eminent practitioners of dentistry deplore their lack of knowledge of pathology, declare the great need for such knowledge and that they would take steps to acquire it—when they got time! Can you blame the dental student for not taking up this work more heartily? He needs pathology; he must have it, and the only place and time for him to get it is at college during the junior and senior years. How much pathology should he have? A thorough knowledge of general pathology,—principles of pathology,—and as much special pathology as it is necessary for him to have. I do not believe that he needs to know the pathology of Bright's disease, nor of cirrhosis of the liver, typhoid fever or tuberculosis meningitis, but he should have at his fingers' ends the principles that are involved in all these affections. He should know general pathology as thoroughly as the medical student, because he has as much need of it. He should be made to appreciate the full meaning of all that is woven into and around pathology. Last year we were told that inflammation is pathology, but that all pathology is not inflammation. Such teaching is disastrous. The term inflammation stands only for the reaction of all tissues to irritations, whether acute or chronic; whether accompanied by marked symptoms of short duration or imperceptible phenomena of long duration. The term as used by many should be abandoned. It is inefficient, misleading and not at all expressive of what is actually going on. Dental caries is as much an inflammation as is alveolar abscess or pyorrhea alveolaris or nephritis or cirrhosis of the liver, and the sooner dental practitioners appreciate that, the better. All these affections are tissue reactions, that is, the visible manifestation of such reaction, and in that sense they are inflammation. And that is what is meant by the term inflammation to-day. It is not only a violent manifestation of pain, heat, redness, swelling and loss of function. These general laws of pathology must be propounded to the student *ad nauseam* one might say, for in that way only can we expect to teach him what we expect him to know. For the teaching of that subject I favor the so-called Socratic method, the combined quiz and lecture or conversational method, making every possible use of the stereopticon and projection apparatus for the purpose of showing on the screen caries of bone and teeth (analogous processes); amyloid degeneration or infiltration; fatty degeneration; thrombus formation; infarcts, the results of embolism, etc., for seeing is believing and, we might add, understanding. I attempt to make the principles of pathology so simple of understanding that the dullest student in the class can comprehend, and that is not so difficult a performance as it may seem to be. A homely illustration often serves to make clear an intricate scientific problem or a phenomenon, and all is fair in teaching that serves to make plain a point. I have always advocated establishing in dental schools a laboratory course in pathology, that is, teaching microscopic pathology, but only within the limitations I have mentioned before. The object in view should be to teach the student pathologic principles, and in doing so the microscope will be found to be of great service, even when the projection apparatus and stereopticon are used. The student sees the tissue as it is and not as it appears on the screen. He prepares the slide himself and thus takes more of an interest in his work. All this teaching can be done by a competent medical man, but the special pathology of the teeth and oral cavity should properly be taught by a dentist, although few seem to be capable of filling that position. All that remains for this teacher to do is to apply to the teeth, when diseased, the principles the student has learned in his course on general pathology, and having seen the slides showing the diseased process he can make such use of his knowledge in practice as will be a joy and a profit to him.

Dr. Carl Weidner,
Louisville, Ky.

I have enjoyed the paper very much, but Dr. Zapffe has taken away every possibility of discussion. He said practically what I intended to say. I believe that all teachers of pathology have found some difficulty in teaching this subject to dental students. I gathered as much from the paper and Dr. Zapffe's remarks, and everyone who has had the experience will appreciate this. But it is not so much the difficulty of teaching this as it is the time at our disposal for teaching the subject. I agree with Dr. Zapffe particularly when he says that the student ought to consider this one of the fundamentals necessary to practice his profession. It not only leads to the practice, but it elevates him, makes him a better man and better prepared to discuss these matters with his confreres or even his patients, many of whom are very intelligent. The dental student ought to have a better knowledge of physiology and the study of the tissues. I often find such knowledge lacking. The student does not take the interest in these vital subjects and sees no reason why he should. I have shown my classes sections which would delight and interest everyone, and which they passed by without showing interest, even sections showing the development of the teeth. If they do that, how can we expect them to take an interest in pathology. We must first create interest in physiology, histology and a certain amount of chemistry otherwise we cannot teach pathology. General pathology ought to be the principle aim and object, and that should be taught by lectures and in the laboratory. We need not enter into special pathlogy, except that of the oral cavity, and that should be taught by a specialist on the subject. Inflammation is a complex subject, and I agree with Dr. Zapffe that it is better to discard the term entirely. It is better to teach what is going on in the tissues. Inflammation is a reactive change taking place in the cell, in the tissues, to some irritant, and no matter whether it is acute or chronic, the result is the same, depending on the nature of the irritant and the resistance of the tissues. We should also teach atrophy, hypertrophy and hyperplasia which are common about the teeth; and tumors, which are common in and about the oral cavity. This can be taught in the laboratory course, as can the infiltrations and degenerations. As to bacteriology,—

we all know that is now a fundamental branch of pathology; it is part and parcel of it. Many diseased process are due to the action of bacteria. It is not necessary to make a bacteriologist of the student; our object should be to teach him to apply it to dentistry. These principles can be taught very nicely in the laboratory and by lectures. As a rule, the course is a little too short and but little can be done, but we can give the dental student as much in that time as we can the medical student. Let him become familiar with bacteria and their life processes; that some bacteria are harmful and others harmless; what they produce in nature; what relation they have to the outer world; what effect they have on the tissues; what relation they have to disease. I find that many students are entirely unfamiliar with the relation of bacteria to disease, even in their own department. They have only a vague idea. Even if he does not apply this knowledge every day at his chair, he will in his own mind and he will be a better man because of that. The student must know something about bacteria, because he must know how to destroy them in the mouth, on instruments, on dressing material, and on his own person. We all know that people have lost teeth because the dentist was not aseptic. That is an important matter to-day. I object to Dr. Cook's remarks about the teacher. He says that the man who teaches this subject should be one-half practising dentist and one-half pathologist and bacteriologist. True, that is the ideal, but it is not practical or possible. I also differ with him in that the teacher of bacteriology must be a dental man. Bacteriology is a universal science and a good pathologist who teaches medical students is equally qualified to teach dental students. I doubt very much that many dental schools can pay a remuneration to make it worth while for a man to devote all his time to the teaching of bacteriology or pathology.

Dr. A. G. Friedrichs, New Orleans, La.

I am heartily in accord with the ideas expressed. I believe that anyone practising dentistry in a scientific way and who is not acquainted with general pathology is a rather unscientific man. In my own school we have the same course in bacteriology that is given to the medical students, as I cannot see how we can practise dentistry without a thorough knowledge of it. The same is true, and in greater degree, of pathology. We need as much of it as the medical men need.

Dr. C. M. Wright, Cincinnati, O.

As this paper was similar in several respects to one I read yesterday, you can understand how highly I appreciate it. I was also very much interested and pleased with the discussion. We all need to know more pathology. When some of us went to college pathology was not taught because we treated only one disease in the mouth, dental caries. 'Some said this was not a disease but only a superficial destruction of tissue. Little by little we began to treat the pulp. Necessarily we began to know more about the histology and pathology of the pulp. Then came abscesses, pyorrhœa, etc. So that in thirty or forty years we got to know about a lot of oral diseases of which we knew nothing before. Possibly it requires a little more preliminary education now on the part of the student to appreciate this extension of knowledge, but we must have it; we cannot get along without it. Several years ago in one of the written examinations at a college in Ohio the question, "What is an abscess?" was answered "It is puss in a sack," and I wondered why the student had not written "a cat in a bag." I thought that only men from Ohio spelled like that, but in our exhibit here to-day I noticed a slide labeled "Puss in a gun-shot wound," and it did not come from Ohio.

Dr. J. D. Patterson, Kansas, City, Mo.

I was very much interested in the paper. When I began teaching pathology many years ago, my course covered a good deal of ground. After noting some of the results in examinations, my enthusiasm waned somewhat, and I gradually began to limit the field I covered, until now it is more limited than ever. That is unfortunate, but it is forced on me because of the limited education of our students. I confine myself to the primary things in teaching pathology. I find that I must give the definitions of many scientific words, and some of them very easy ones, too, before I can instill even basic principles into their minds. I do not care how many lectures you give, you must confine the field on account of the fact that we teach pathology to unprepared minds, and, excepting a few, students do not become proficient in it. I try to instill into them the pride there is in such knowledge before I begin the actual work, which, as I said, is confined to primal principles. Teach them so that they can speak intelligently of any pathologic condition in the oral cavity or any other part of the body.

Dr. Cook

There is so much to be said on this subject that there is hardly sufficient time at our command to say it all. We are free to confess that advancement in dentistry has been along the scientific lines. As Dr. Zapffe said, we must draw on the sciences for everything that can be of any use to us. Every advancement is the result of years of study and investigation by scientific men. But it was a dentist who gave us the real fundamental principles of the pathology of caries, and that is why I say that in order that our profession may advance in pathologic work, dentists should educate themselves better in pathology. I reverence the profession of medicine, and I take off my hat to the two gentlemen who so liberally discussed my paper. At the same time these men are not working with the teeth and the oral cavity all the time;

they are not specially interested in these structures, and they cannot do what dentists should do, men who are interested can do. Bacteriology is one of the broadest sciences; it embraces some of the greatest fundamental problems of the scientific world, and we must have specialists like Miller to advance these things along dental lines to enrich our profession. The teaching of these subjects requires much time and thought both in and out of the laboratory, and therefore, the teacher ought to be able to devote at least half his time to these subjects, at the same time keeping in touch with the practical end of the work. The greatest and most important work was done by men working at the chair, but they were also studying. I am glad we have a few medical men who are willing to give some of their time to this, as long as we cannot afford to have men devote all their time to it. I wish we could have the transactions of this body placed in every scientific library in the country. I have looked through the libraries at home, but failed to find anything of value about our teaching methods. Scientific men visit these libraries constantly; men who are interested in things we discuss, but they cannot find anything. Therefore, I suggest that we send as many copies as we can to some of the scientific libraries in the larger cities.

The Masticating Surfaces of Artificial Teeth.

By R. Brewster, Chicago, Ill.

Mr. President and Members of the Institute of Dental Pedagogics,—I esteem the privilege afforded me by your committee of bringing before you my views on mastication in relation to the articulation of artificial sets of teeth.

In supplying full upper and lower dentures, one of our first considerations is that they shall render efficient service in the mastication of food. For this purpose we desire to use teeth with pronounced cusps, but are met with the difficulty that pronounced cusps tend to displacement of the denture. Recognizing this difficulty, it is by no means uncommon practice to remove these prominences until the occluding surfaces of the teeth are little better than mill-stone surfaces.

My own individual necessity in having to wear artificial substitutes led me to investigate the subject of cusp formation, and in connection therewith the movements of the lower jaw in mastication.

The conclusions reached, I may say, are at variance with the generally accepted views upon these subjects.

It appears that under the stimulus of food, the muscles in mastication act without a conscious effort. This automatic action—as it may be termed—is sometimes brought forcibly home to us, when a piece of bone, which has escaped the vigilance of the tongue or mucous surface, is bitten upon with force.

The primary action of the temporal and masseter muscles, assisted by the internal pterygoids, is apparently to raise the lower jaw vertically to absolute occlusion, and it is *very* doubtful whether, during mastication, this *direct motion* is ever modified *without a conscious effort.*

When the full force of these muscles has been exerted upon food opposing the closure of the jaws, they give place to those whose function is to laterally displace the lower jaw, carrying with it the food from under the upper teeth, that it may be manipulated by the tongue, bathed in saliva, and brought again to its position upon the crowns of the lower teeth for the next direct closure of the jaws.

The cusp formation of the posterior teeth, presenting, as they do, a series of modified inclined planes—especially adapted for the separation of fibrous or other hard material—strongly supports the view that, although by a conscious effort during direct biting the lower jaw may be moved laterally, such a movement is made at the expense of pressure, the efficient work of comminuting food, whether of a fibrous or hard, granular character, being accomplished only by the direct upward movement of the lower jaw. The mastication of soft foods, that offer no resistance to the complete closure of the jaws, is left to the tongue, buccinators and those muscles controlling the lateral movement of the jaw.

Assuming, then, the correctness of this view, the more pronounced the cusps—given a perfect articulation—the better the masticatory apparatus. Whilst this is true as regards natural teeth, it is not so with artificial substitutes. Pronounced cusps on artificial teeth, especially for edentulous mouths, have not, as before stated, proved successful.

This leads us, then, to the conclusion that the disintegration of food by incision, rather than by crushing or grinding, is the more correct method for man. This implies hard foods—not necessarily entirely fibrous—but foods that in mastication develop the muscles that raise the lower jaw. The ability to chew hard material is admittedly advantageous to the individual. A careful examination of a large number of cases would probably disclose the fact that persons whose normal bite registered much above the average would be found to have stronger teeth and a lessened, if not entire absence, of pyorrhea tendencies. These persons would also be found to select by preference food that required hard chewing rather than made-up dishes and semi-liquid foods.

A discussion of these very interesting points is, however, going somewhat beyond the scope of this paper, which has for its object a closer examination of the characters of the artificial substitutes we are called upon to supply to patients, and the suggestion of a remedy for some of our present disabilities in this respect.

Designers of artificial teeth have carried the natural cusp formation (suitable only for single crowns) into their full sets without apparently any good reason, beyond a desire to make them *look* natural. But natural conditions do not exist; the artificial denture, resting merely upon a smooth mucous surface, needs different treatment. The *most efficient surface possible* for comminuting food becomes the more imperatively necessary in view of the unnatural conditions present when wearing artificial dentures.

Having reached these conclusions, your essayist commenced a series of experiments, with a view of adding more power, more efficiency, to an artificial denture, and the cusp formation now presented for your consideration is the one (taken from a number of designs) believed best suited for the purpose. It will be observed that the crests of the cusps present a level surface—that the superficial area of the occluding surface is divided into a series of inclined planes (Fig. 1), thus increasing efficiency very many times,—that when brought to occlusion the opposing teeth are locked, that is say, the incising surfaces are effective from the time they enter each other.

This cusp formation presents no difficulties in the matter of articulating sets of teeth, but on the contrary renders this portion of the work more simple.

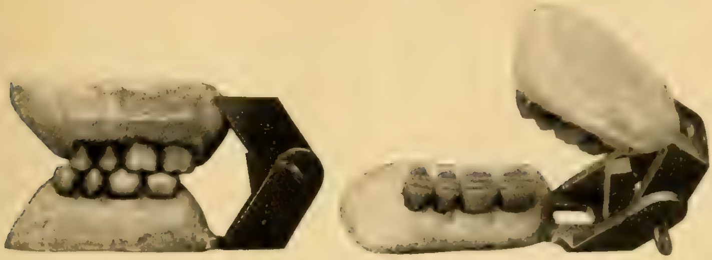

FIG. 1.

To ascertain the relative efficiency of this form of cusp formation, as compared with natural teeth, various materials were tested, and it was found that the actual disintegrating effect was greatly in favor of this form of tooth. Upon some of the materials used in the tests a pressure of fifty pounds was equivalent to one hundred and fifty pounds in the human mouth upon the same material.

Of all the materials used in these trials sheet gutta percha has been found to give the best results. It is not so readily affected by moisture, and may be used at various degrees of hardness, which is an important feature.

When these teeth reach your hands for trial, I would suggest your ascertaining by gnatho-dynamometer tests the power those persons can exert who are to bite into your testing materials.

In conclusion, gentlemen, I bring this subject before the Institute of Dental Pedagogics because this society represents the teachers of the country, and because I desire to interest them in a phase of the subject of mastication, and of the usefulness of artificial teeth which I believe to be new, and both scientific and practical.

The Institute of Dental Pedagogics

Serial
A
13
1905
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13th Annual Meeting

Held at New York City
December 28, 29, 30, 1905

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Thirteenth Annual Meeting
OF THE
Institute of Dental Pedagogics

MINUTES.

The thirteenth annual meeting of the Institute of Dental Pedagogics was held December 28th, 29th and 30th, 1905, at the Fifth Avenue Hotel, New York City.

Thursday Morning Session.

Dr. S. H. Guilford, president, called the meeting to order at 11.10 Thursday morning, December 28th. Dr. F. D. Weisse, of New York, welcomed the Institute. (Page 18.)

This was replied to by Dr. J. B. Willmott, of Toronto. (Page 18.)

On motion of the secretary, the minutes of the last meeting were adopted as published in the proceedings.

The secretary-treasurer presented his report as follows, which was referred to the Executive Board:

REPORT OF SECRETARY-TREASURER FOR 1905.

As no dental journal offered to take the proceedings of our last meeting, the Executive Board gave the publishing of the pamphlet into the charge of your secretary.

The stenographer's report was mailed to each of those taking part, about February 11th.

On account of several circumstances, some of which were unavoidable, the book was not ready till late in August. A copy was then sent to everyone who was present at either the 1903 or 1904 meeting.

In October a letter was sent to the Dean of each school in the N.A.D.F., asking for copies of all the blank forms or charts used in keeping records or for giving information to their students. Twenty-four out of the fifty-two schools sent something, which has been mounted on cards, and will form a very valuable and interesting feature of the exhibit at this meeting.

In November a circular calling attention to this meeting was sent to over one thousand members of the staffs of the colleges in the N.A.D.F., with a special letter to each Dean, urging a large attendance from his school.

During the year upwards of 1,500 separate articles have been received or sent through the mails by your secretary.

Number of colleges, members reported Dec. 27, 1904	38
Number admitted at last meeting	1
Number dropped for non-payment of fees	1
Number resigned	1
Present membership	37

FINANCIAL STATEMENT.

Cash on hand, December, 1904,	$250 75
Received from schools, fees	330 00
Bank interest	8 86
	$589 61

Expenditure.

Expenses Executive Board, 1904	$33 71
Expenses of exhibits, 1904	5 00
Engraving gavel	14 00
Printing and stationery	6 90
Circulars and envelopes to staffs, and addressing	13 75
Expenses secretary's office, postage, telegrams, express, etc.	41 26
Cost of proceedings	250 60
Honorarium for secretary	25 00
Cash on hand	199 39
	$589 61

W. E. Willmott,
Sec.-Treas.

Approved Dec. 28, 1905.

J. H. Kennerly,
Ellison Hillyer.
Executive Board.

Dr. Kennerly, chairman of the Executive Board, presented a verbal report, which was adopted on motion.

Dr. Kennerly moved to change the Constitution as follows, notice of which was given at the last meeting:

That Sections 2, 3 and 4 of Article IV., respectively, be designated as Sections 3, 4 and 5, respectively, and the following incorporated as Section 2:

"In the event of the withdrawal from the National Association of Dental Faculties of any school holding membership in this Institute, such membership may be retained at the request of the accredited representative of such school by a two-thirds affirmative vote of those present."

Application of the Medico-Chirurgical College, of Philadelphia, for reinstatement, was recommended by the Executive Board. The recommendation was adopted on motion. (This college had resigned from the National Association of Dental Faculties, and in accordance with the above change in the Constitution was eligible for membership.)

Application from the Dental Department of Georgetown University, Washington, was recommended by the Executive Board. Recommendation adopted on motion.

President called Vice-President Dr. Stubblefield to the chair, and presented his annual address. (See page 19.)

On motion of Drs. Weisse and Byram, the chairman was instructed to appoint a committee to tabulate the ideas for discussion, in the president's address, and report at later session. The chairman appointed as this committee Drs. Weisse and Brophy.

A paper by Dr. Prinz, of St. Louis, on "Anesthesia: How it Should be Taught," was read by Dr. Kennerly, Dr. Prinz not being able to be present. On motion of Dr. Weisse, this paper was referred to a committee of two to present the discussion at later session. The chairman appointed Drs. Brophy and Oliver as this committee. (See page 26.)

The local committee, through Dr. Hillyer, invited the Institute to dinner and the Hippodrome on Friday evening.

Meeting adjourned at 12.15 until 2 p.m.

Thursday Afternoon Session.

President called meeting to order at 2.30. Minutes of previous session were read and approved. Dr. Brophy reported for the committee to consider Dr. Prinz's paper (see page 26). Discussion was continued by Drs. Oliver, Brophy, Friedrichs, Weisse, Friedrichs, Kennerly, Oliver, Weisse, Starr and H. T. Smith. Subject was passed on motion.

Dr. Hillyer presented his paper on "Prosthetic Technic: How it Should be Taught (see page 42). Discussion was opened by Dr. Byram, and continued by Drs. Sanger, Snow, J. B. Willmott, Bowles, and Littig. Discussion closed by Dr. Hillyer.

Dr. Squire presented a paper on "Operative Technic: How it Should be Taught" (see page 51). Discussion was opened by Dr. Darby, and continued by Drs. Hart, Kennerly, Webster, Brophy and Freizell.

As the hour for adjournment had arrived, the discussion was postponed until next sesion. Executive Board reported on treasurer's statement, as follows:

To the Institute of Dental Pedagogics: Your Executive Board beg leave to report that they have thoroughly examined the report of the secretary-treasurer, and find his financial statement absolutely correct.

J. H. KENNERLY, *Chairman.*
ELLISON HILLYER.

New York, Dec. 28, 1905.

Meeting adjourned at 5.45 to meet at the New York College of Dentistry for evening session at 8 o'clock.

THURSDAY EVENING SESSION.

Session held in New York College of Dentistry at 8.15. President in the chair.

Dr. Cryer presented a paper on "Oral Surgery: How it Should be Taught," illustrated by lantern slides (see page 73).

Discussion was opened by Dr. Brophy, and continued by Drs. Stein, Abbott, Dubeau, and closed by Dr. Cryer.

Dr. Stein showed a number of lantern slides on his method of teaching "Histology" by microscopic projection.

Meeting adjourned at 10 o'clock. The entire building was opened for inspection, with members of the staff present in the different laboratories to make explanations.

FRIDAY MORNING SESSION.

President called meeting at 10.40. Minutes of two previous sessions read and approved. Discussion of Dr. Squire's paper was continued by Drs. Oliver, Semans, Brophy, Webster, Hall, Starr, Byram, Hillyer, Byram, Hillyer, Byram, Hillyer, Byram, Hillyer, Semans, Warren, Foster, Brophy, Freizell, and closed by Dr. Squires.

Executive Board recommended that the courtesy of the floor be extended to any visitors present. Recommendation was adopted on motion.

Dr. Warren presented a paper on "The Teaching of Crown and Bridge Work, a Point of View" (see page 87). Discussion was opened by Dr. Sanger, and continued by Drs. Mitchell, Nones, Snow, Hillyer, Nones, Hart, Nones, Byram, Hart, Freisell, Nones and Guilford, and closed by Dr. Warren.

A patient on whom Dr. Brophy operated for cleft palate three years ago was present, and the members were given the privilege of inspecting the result.

Adjourned at 12.45.

FRIDAY AFTERNOON SESSION.

President called meeting to order at 2.30. Minutes of previous session read and approved.

Dr. Ford presented his paper on "General Dental Education" (see page 102). Discussion opened by Dr. Brophy, and continued by Drs. Hillyer, Littig, Semans, J. B. Willmott, Dubeau, Kennerly, Brophy, Inglis, Brophy, and closed by Dr. Ford.

Dr. Stubblefield presented his paper on "Chemistry: How it Should be Taught" (see page 121). Discussion by Drs. Harlan, Weisse and Ward. Discussion closed by Dr. Stubblefield.

Adjourned at 4.45 to accept invitation of New York Schools to dinner and to the Hippodrome.

SATURDAY MORNING SESSION.

Session opened at 9.50. President in chair. Minutes of previous session read and approved.

Symposium on infirmary methods.

Preliminaries by Dr. J. H. Kennerly (see page 129).
Operations by Dr. O. Inglis (see page 132).
Conduct of Students, by Dr. A. E. Webster (see page 135).

Discussion was opened by Dr. Friedrichs, and continued by Drs. Hall, Foster, Smith, Semans, Brophy, McLernon, Freizell, Nones, Knight, Byram and Weisse and closed by Drs. Kennerly, Inglis and Webster.

Dr. Weisse presented a report of the Committee on President's Address (see page 25).

On motion of Drs. Weisse and Brophy, report was adopted. Motion by Drs. Knight and Byram that a commission of three be appointed, of which the retiring president shall be chairman, to carry out the suggestions in the report. Moved by Drs. Weisse and Foster that the president-elect appoint this commission. Carried.

Dr. Foster presented his report as Master of Exhibits, as follows, which was carried on motion, after some discussion:

Mr. President and Members of the Institute of Dental Pedagogics: Gentlemen,—The difficulty existing this session, as formerly, is in not having the schools report what they propose to send to this Institute in the way of exhibits.

The Master of Exhibits, as well as the Master of New Teaching Methods, has no idea what to expect upon his arrival at the hotel where the meeting of the Institute is to be held.

There is no way of ascertaining the location of exhibits when a lot of boxes, etc., are found stored in a room and not properly listed. One is not sure if this is all or only a part of the exhibits, and that other exhibits may not be in another part of the house.

Perhaps the second day of the meeting some one will ask, "What has become of our exhibit?" and upon inquiry the said exhibit will be found in the janitor's room or behind some door.

Had the Masters of the different exhibits been notified that such and such an exhibit had been sent to the Institute, all this annoyance could have been avoided, because if the article listed was not in the room, inquiry could be made, and the article traced.

Your Master of Exhibits had but one institution notify him that it would send an exhibit.

I know, from a letter written me by the Master of New Teaching Methods, that he has been treated in the same manner.

A teacher representing a school, wished to know why the exhibit from his school was not on exhibition, and after an exhaustive search it could not be found. The difficulty was it had not been sent at all, the dean of the school not having it in the shape he desired, and the representative had not been notified of this until the last day of the meeting.

The exhibits of late have greatly diminished in number, and the interest in them has lessened. The question is asked, "Why is this, and what can be suggested to create greater interest in this most important branch of the Institute?" Some years ago it was the custom to take the exhibits into the class room and there have the instructor representing them explain fully, step by step, the methods of teaching in his school. In this way the different schools were impressed with the importance of having a good exhibit that would be seen by all. This has been a potent factor in former exhibits. Since the first few sessions of this Institute we have had very few *new* exhibits. Now papers are substituted, and the exhibits and appliances are collected in a room, at times remote from the meeting room, with no one present able to explain the points of the different methods.

Permit me here to offer a suggestion: I would have the exhibits and new teaching methods at the meetings of the Institute brought back into the meeting room and instructions given there in reference to them. It is my impression that this is the better method to create interest in new exhibits, thus giving to the schools a greater desire to have brought before this body something that has not been shown at prior meetings.

Try this for a session or two, and see what can be done. Do not misunderstand me. I do not suggest to do away with the papers; but I do suggest having the exhibits demonstrated in the meeting room. Some of you, no doubt, will remark that this will take too much time. It would not take too much time from the present exhibit.

In the future, should the exhibits become too numerous, have a special committee appointed, whose duty it will be each session to examine into and select such exhibits as may be deemed best to place before the Institute.

I have the pleasure to report the following exhibits shown this session. Six schools have responded, as follows:

INDIANA DENTAL COLLEGE.—Models on cavity preparation for metal fillings; another for porcelain inlays. A system of an experimental course in porcelain, showing model teeth carved in modelling composition. Moulded teeth biscuited and fused. A system of teaching colors and the fusing of porcelain.

CHICAGO COLLEGE OF DENTAL SURGERY.—Carved teeth, instruments and mounted sections of teeth.

UNIVERSITY OF MICHIGAN.—Models in plaster teeth. Specimen of natural teeth with malformation. Models of student work.

New York College of Dentistry.—Adjustable interdental splint. Mounted models of porcelain fused teeth, regulating appliance.

University of Pennsylvania.—Anatomical specimens, including sections of the face, impacted teeth, and other pathological conditions. Anatomical slides shown in illuminating frames. Stereoscopic anatomical photographs. X-ray photographs.

University of Buffalo.—Operative technic of freshman and junior students.

All of which is respectfully submitted.

W. G. Foster.

Dr. Brophy brought before the members the aims of the International Dental Federation, and called attention to the meeting during the summer of 1906 as follows:

"I would like to make an announcement. This, we believe, is the representative teaching body of the dental institutions of the United States and Canada, and, having for a number of years been interested in educational work of international character, I want to announce that the next meeting of the International Commission of Dental Education will assemble in Geneva in August, 1906. I would like to interest every institution in this country. There is no question but that it is bound to play an important part in the development of all that pertains to dental endeavor in every country of the world. I would like very much to secure from the members of this body, and the institutions which hold membership in this body, assurances of something in the way of written communications to the meeting, especially of the International Commission of Dental Education. The committee will take on a different kind of work. Instead of starting to organize and get in shape to go to work, it is already organized, and there will be discussion on the different topics. There are the Commissions on Hygiene, on History, on Nomenclature, on Dental Service in the armies and navies of the world, etc., commissions including almost every branch that pertains to the development of the profession in an educational and practical way. I hope that very soon after you receive a communication from me requesting you to take part in the meeting, you will report something bearing on the subject of dental education, with the same good-will that you have done everything at this meeting, which, I believe, will be a memorable one.

The meeting has been marked by an earnestness and an enthusiasm and a spirit of good-fellowship which places it high in rank among the educational gatherings in this profession. Write something on some subject that may be suggested, or a number may be suggested from which to choose. Since it is only a little trip across the ocean nowadays, I hope many will go. We have always had a large representation from the United States and Canada. At Hanover, I think, there were about twelve or fifteen representatives from the United States, and that was only a meeting to perfect the organization of the Federation. The next meeting will be more of a literary character, and the work of the association, when published, will be read with a great deal of interest by everyone interested in dental education."

Moved by Drs. Sanger and J. B. Willmott, that the president and secretary present certificates to those members who wish to attend the meeting of the International Dental Federation at Geneva in 1906. Carried.

Dr. Byram presented his report of Master of Teaching Appliances, as follows, which was adopted on motion:

To the Members of the Institute of Dental Pedagogics: Your Master of New Teaching Methods begs to make the following report:

It seems almost impossible to differentiate between the work of the Master of New Teaching Methods and Master of Exhibits, in that any well arranged exhibit will contain the models showing the new teaching methods.

The Master of Exhibits and the Master of New Teaching Methods have worked in harmony, and have tried to have a good exhibit; but the deans of the various colleges have turned a deaf ear to our pleadings.

On November 21st, your Master of New Teaching Methods mailed a letter to each dean, asking that all charts, drawings, models, lecture notes, etc., be sent to the meeting to be displayed. I received four replies, two saying that an exhibit would be sent, and two declining to send an exhibit.

In order that it might not appear that your Master of New Teaching Methods had neglected his duty, he decided to write the publishers for copies of their text-books and make a short review of them. The following is the review:

"Artificial Crown, Bridge and Porcelain Work," seventh edition, by Dr. Geo. E. Evans (S. S. White Dental Mfg. Co., publishers). The author has reviewed this work, and culled many of the old methods, and added several modern ones. He has also added a great deal of new subject matter on porcelain and its various uses. The book contains a great deal of valuable information, and should be used by the students as a reference book.

"Notes on Dental Porcelain," by Dr. V. Walter Gilbert (S. S. White Dental Mfg. Co., publishers). A treatise on porcelain, outlining a course for the beginner. The author begins with a consideration of porcelain in general, its place in dentistry; then he discusses the various porcelains on the market. The chapter on laboratory experiments is of especial interest to both teacher and student. There are many good suggestions on the construction of porcelain crowns and inlays, also on the shading of porcelains and the use of mineral stains. Your committee believes that every senior student should be required to study this book.

"Porcelain Inlay," by Dr. Arthur E. Peck, a treatise on its theory and practice in Dentistry. The author has added new methods and a number of new cuts to the third edtiion ot his book. There are many good suggestions on cavity preparation, matrix formation, construction and shading inlays. The author outlines a special method, and one that probably would not be practicable as a universal method for instructing students. However, it contains so many good suggestions that your committee recommends it as a reference book.

"A Manual of Mechanical Dentistry and Metallurgy," second edition, by Dr. Geo. U. Warren (P. Blakiston's Son and Co., publishers). Your committee believes manuals on prosthetic dentistry to be unsatisfactory as text-books, because of lack of detail. The author still clings to the name of "Mechanical Dentistry." We suggest that this body recommend to the author that he change the title to "Prosthetic Dentistry." The author says: "It is presented as a convenient every-day working book." While the most of his book is excerpted from the seventh edition of his "Mechanical Dentistry," there are, however, many suggestions not found in the larger volume. The chapter on "The Esthetic and Physiognomical Requirements for the Selection and Arrangement of Artificial Teeth" deserves special mention.

We take pleasure in referring to "The Principles and Practice of Crowning Teeth," by Dr. H. J. Goslee (Consolidated Dental Mfg. Co., publishers). While this book was given to the profession in 1903, it is probably the most up-to-date book on this subject. The author has presented the subject matter in a concise form, and has avoided the consideration of obsolete methods. Your committee believes that every student should study this work.

"The American Text Book of Operative Dentistry," third edition, edited by Dr. E. C. Kirk (Lea Brothers, publishers). This book has been thoroughly revised, and nearly 200 pages of new matter has been added. The editor has revised the chapters written by the late Dr. Burchard, and Dr. E. H. Angle has taken the late Dr. C. S. Goddard's place as author of the chapter on "Orthodontia." The chapter on "Dental Embryology" has been displaced by a chapter on "Dental Histology with Reference to Operative Dentistry," by Dr. F. B. Noyes, which is beautifully illustrated by sections skilfully prepared by the writer. There has been a chapter added on "The Use of the Matrix in Filling Operations," by William Crenshaw. The chapter on "Inlays," written by Dr. Joseph Head, is concise, practical and sufficient to be of great assistance to the student.

"Dental Metallurgy," by Dr. Chas. J. Essig, revised by Dr. Augustus Koenig (Lea Brothers, publishers). The edition presents thirty-two new illustrations, and the addition of new subject matter. The chapter on "Amalgam" has been thoroughly revised, and made to embody the latest investigations of this class of compounds.

"Oral Pathology and Therapeutics," by Dr. Elgin MaWhinney (Consolidated Dental Mfg. Co., publishers). The author has not gone into detail, but has concisely written on all subjects pertaining to oral and dental pathology. The book is well illustrated, and contains many of the latest and best methods for the treatment of the pathological conditions of the oral cavity.

"Dental Materia Medica, Therapeutics and Prescription Writing," by Dr. E. H. Long (Lea Brothers, publishers). There is great need of a modern text-book on this important branch for the use of dental students. The author has treated (1) the remedies that belong to the special field of dental medicine; (2) the action and application of the most important general remedies, emphasizing those whose action may avail in dental diseases; and (3) to furnish reference that will cover the demand of the student.

"Burchard's Dental Pathology and Therapeutics," as revised by O. E. Inglis (Lea Brothers, publishers). This work, even before its revision, was the most scientific and the best work on these subjects extant. The work of the reviser has been, in the main, productive only of good. Dr. Inglis has brought the book down to date as our knowledge of the subject exists, and has bettered it in the doing. The chapters on "Pharmacology" have been omitted entirely in the new edition, and with justification. The section on "Embryology, Anatomy and Histology" has been retained, without good reason, as the subjects are more exhaustively treated in other text-books, and are unnecessary incorporated in a work on pathology. The chapters on "Dental Caries" are an improvement on the first edition, in that they embody the latest information on this subject. The chapter devoted to stomatitis, and correlated diseases might better have been expanded to a sub-heading, "Diseases Beginning in the Mucous Membrane of the Mouth," or something similar.

I have one suggestion to make to my successor. Many of the manufacturers have new appliances which, if exhibited, would be instructive. The other day I saw at a clinic an appliance for removable bridgework. It is known as the Morgan system, manufactured by the Morgan Dental Specialty Co., Davenport, Iowa. The manufacturer is anxious to have this system introduced. He is willing to send free one of the jigs and enough German silver attachments that all students may have the opportunity of constructing removable bridges. If any of you are anxious to have one, write to the manufacturer, and he will send it to you.

Mr. Robert Brewster presents a new crown for bridgework. I believe it is the best detachable crown on the market, and that the principles of constructing bridges with it should be taught.

There is a new form of interdental splint. The designer is Dr. Rabell, a member of the Faculty of the New York College of Dentistry. It seems to be quite an ingenious device.

I want to emphasize what Dr. Foster said. I have been connected with dental associations for the last ten years, and I have had the hardest time to get dentists to reply to letters, and those of you who are deans are just as careless as the average dentist. You cannot expect us to do all the work. If you will not co-operate with us, say so, and we will quit work. We do not want to write you and have you throw our letters in the waste-basket. Now I say to you, get better!

I should have given Dr. Willmott credit for the work he has done. He has written to the various colleges, and he *did* succeed in getting hold of some infirmary records. It has been suggested that we can express these to the various colleges in order that they may be studied and the good points copied. We should do this in a systematic way. I would suggest that the secretary have charge of the forwarding of this exhibit.

In the exhibit of infirmary records the first chart was a picture of a college. We enjoy looking at pictures, but let us send something that is more useful.

All of which is respectfully submitted.

J. Q. Byram.

The balloting for the election of officers resulted as follows: Dr. D. R. Stubblefield, President; Dr. J. H. Kennerly, Vice-President; Dr. W. E. Willmott, Secretary-Treasurer; Dr. J. Q. Byram as member of Executive Board for three years.

Moved by Drs. Brophy and Stubblefield, on account of Dr. Bethel's unavoidable absence from the last two meetings, that Dr. Hillyer be appointed chairman of the Executive Board for the ensuing year. Carried.

Moved by Drs. Brophy and Kennerly, that the hearty thanks of the Institute be extended to the New York schools for their cordial hospitality extended to the members present. Carried.

The president-elect was introduced, and replied with a few appropriate remarks.

On motion of Drs. Friedrichs and Freisell, a vote of thanks was extended to the retiring president for his untiring efforts during the past year.

Drs. Brophy and Friedrichs extended a hearty invitation for the Institute to hold its next meeting in Chicago and New Orleans, respectively.

The president appointed as the Commission on Nomenclature, Drs. Guilford, Brophy and J. B. Willmott.

Minutes of session were read and approved.

Meeting adjourned *sine die*.

At a meeting of the Executive Board, held immediately after adjournment, it was decided to hold the next meeting in Chicago on December 27th, 28th and 29th, 1906. Dr. H. E. Freisell was appointed Master of Exhibits, and Dr. E. C. Jones, Master of New Teaching Facilities.

APPENDIX A.

List of membership colleges with representatives present, dues paid and entitled to vote:

Dental Department, Washington University, St. Louis, Mo.—J. H. Kennerly.

Royal College of Dental Surgeons, Toronto, Ont.—J. B. Willmott, W. E. Willmott, A. E. Webster, E. C. Abbott, H. R. Abbott, C. E. Pearson.

Indiana Dental College, Indianapolis, Ind.—R. T. Oliver, J. Q. Byram.

University of Buffalo, Dental Department, Buffalo, N.Y.—G. B. Snow, M. L. Fay, D. H. Squire, L. L. M. Waugh.

Medico-Chirurgical College, Department of Dentistry, Philadelphia, Pa.—Robert H. Nones.

New Orleans College of Dentistry, New Orleans, La.—A. G. Friedrichs.

Pennsylvania College of Dental Surgery, Philadelphia, Pa.—J. Norman Bromell, Justin E. Nyce, Geo. W. Warren.

Pittsburg Dental College, Pittsburg, Pa.—H. E. Freisell, J. S. Ashbrook.

University of Pennsylvania, Department of Dentistry.—M. H. Cryer, A. DeWitt Gritman, E. T. Darby.

Dental Department, Georgetown University, Washington, D.C.—Shirley W. Bowles, P. W. Evans.

Dental Department, Ohio Medical University, Columbus, Ohio.—H. M. Semans, K. C. Brashear.

Dental Department, Vanderbilt University, Nashville, Ky.—D. R. Stubblefield.

Howard University, Washington, D.C.—C. H. Howland, H. P. Davis, C. S. Wormley.

College of Oral and Dental Surgery, New York.—J. I. Hart, R. M. Sanger, C. M. Ford, W. S. Russell, D. W. Ward.

Ohio College of Dental Surgery, Cincinnati, Ohio.—H. T. Smith.

Chicago College of Dental Surgery, Chicago, Ill.—T. W. Brophy.

Philadelphia Dental College, Philadelphia, Pa.—S. H. Guilford, O. E. Inglis, H. B. Mitchell, T. J. McLernon, C. F. Wilber.

New York College of Dentistry.—F. D. Weisse, J. Bond Littig, Ellison Hillyer, A. R. Starr, C. F. Rabell, J. B. Stein.

University of Michigan, Dental Department, Ann Arbor, Mich.—Louis P. Hall.

Tufts Dental School, Boston, Mass.—E. W. Branigan, J. K. Knight, F. M. Hemenway, B. H. Strout, W. P. Houston, Wm. Rice, I. J. Wetherbee, H. S. Robinson.

Baltimore College of Dental Surgery, Baltimore, Md.—W. G. Foster.

Visitors: Eudore Dubeau, Montreal, Que.; A. W. Harlan, New York City.

Membership colleges not represented: Northwestern University Dental School; College of Dentistry, University of Minnesota; Louisville College of Dentistry; Dental Department, Western Reserve University; Dental Department, University of California; University of Iowa College of Dentistry; Kansas City Dental College; Cincinnati College of Dental Surgery; Department of Dental Surgery, Detroit College of Medicine; St. Louis Dental College; Dental Department, Milwaukee Medical College; Dental Department, University of Omaha; Illinois School of Dentistry; College of Dentistry, University of Southern California; Colorado College of Dental Surgery; Wisconsin College of Physicians and Surgeons, Dental Department.

Colleges represented by delegates, 21; colleges not represented, 16; colleges admitted at this meeting, 2; colleges dropped for non-payment of fees, 1; present membership, 37.

W. E. WILLMOTT.
Sec.-Treas.

Toronto, January, 1906.

Address of Welcome.

By Dr. F. D. Weisse, New York, N.Y.

Gentlemen, members of the Institute of Dental Pedagogics,—Representing the dental institutions of New York City, I tender you a hearty welcome.

We have desired for a number of years that the Institute should meet here, and we rejoice now at your being with us.

We will endeavor to make your stay as pleasant as possible, that you may carry away happy reminiscences of your visit to our "village."

I can but repeat that we most sincerely welcome you to the City of New York.

Response to Address of Welcome.

By Dr. J. B. Willmott, of Toronto, Canada.

Mr. President, Ladies and Gentlemen,—On behalf of the Institute of Dental Pedagogics, it is my duty to very briefly return thanks for the cordial welcome extended to us on behalf of the dentists of New York by Dr. Weisse, of the New York College of Dentistry. To most of us, I presume, a visit to the City of New York is always associated with more or less of interest outside of professional matters.

In coming to what I am sure New Yorkers call the hub of the universe, we expect to find as well in matters professional as otherwise, everything of the latest and best, and I think we can promise, in return, that the Institute has brought to your city the best programme ever provided for any of our meetings.

As the time is already an hour late, it would not be wise for me to delay the proceedings any longer, and I can only say to the dentists of New York, represented by our friends, that we appreciate your welcome and will make the best possible use of it.

President's Address.

By Dr. S. H. Guilford, Philadelphia.

It is customary, I believe, on occasions of this character to cast a mental retrospect over the origin, development and achievements of the organization of which each one of us forms a part, and to feel a pardonable pride in what we have accomplished. Such a review of the past is commendable, for it promotes good feeling and stimulates us to greater and better efforts in the future.

Every individual at some period of his career is apt to congratulate the world upon his birth, his growth, his talents, his industry, and the great things which he has helped to promote, and to reflect pitifully upon what the universe would have been had he not been created. In similar fashion it is altogether human for an organization to feel that its birth was a necessity and that it exists in response to a real want. Surely such was the case with the Institute of Dental Pedagogics or, as it was first named, the National School of Dental Technics, for it was organized to fill a well-recognized gap in the dental curriculum.

Following the gradual decadence of private laboratory and office instruction, students came to our colleges direct from institutions of learning without any training of hand or eye to serve as an introductory equipment for the manipulative part of their college work.

It was considered best that they should do so, for it was felt that this preliminary training could be given more systematically and along more rational lines by properly chosen college demonstrators and instructors than by the rude apprentice system followed in most offices.

Unfortunately, however, no real system for such instruction presented itself at the time of its need, and the beginners were allowed largely to shift for themselves and follow and imitate the work of those in the advanced classes. We were doing, indeed, what the manufacturing establishments had long been doing with their apprentices, surrounding the initiates with opportunities but failing to show them how best to take advantage of them.

The manual training idea of systematic and progressive elementary training had not yet been grasped by dental teachers.

and as students were making fairly good progress after their own fashion, matters were allowed to drift.

Eventually, however, the need of better methods became more and more apparent, and our new organization came into existence for the purpose of devising and carrying into effect some system whereby the new student might receive his first instruction along the general lines of the manual training school. I need not tell you, for you all know, how well the idea was received by the profession at large, and what rapid progress was made in its development.

Not only were the schools in our own land materially bettered by the innovation, but those in foreign countries became interested in the plan and hailed it as a great advance in methods of dental instruction.

We had indeed " builded better than we knew."

Naturally we felt proud of our achievement, and it marked the first stage of usefulness of our organization.

Once fully developed and placed in successful operation it was deemed best to seek some other new and broader field for the exercise of our activities.

The broadening of our sphere of usefulness outside of our original domain necessitated the changing of our name to fit it to the new conditions.

This was done, and pedagogics or the science of teaching became our new theme, and we entered upon it with all the zeal and earnestness that marked our original efforts.

The new departure was not brought about by a desire to arrogate to ourselves the function of some other educational body, but simply, as in the first instance, to fill a gap in educational work that had not yet been filled.

The National Association of Dental Faculties had this object largely in view in its organization, but legislative affairs had so taken up the time of its meetings that none seemed left for the accomplishment of this more important work.

In view of this it appeared but natural and right that we should assume it.

The success that attended our efforts has been manifested in the benefit each one of us has derived from our last half dozen meetings. Different methods of teaching the various branches included in our curriculum have been presented by the teachers of those branches, and from them and the discussions following we have in each instance been able to appropriate ideas that have materially helped us in our college work.

And while we felt that we as individuals were receiving the benefit, we were really only the channels through which the advantage flowed to the students under our care. The full measure of this benefit cannot be computed or exactly known, but it could not be otherwise than great since it represented the many-sided experiences of those who had devoted very many years to the teaching of students, and who had given much thought to the improvement of methods of instruction.

A glance at the programmes of the past several meetings will show the variety of subjects presented and discussed at each one of them, and that which has been prepared by our Executive Committee for this meeting is perhaps the richest in variety and interest of any thus far presented.

Even with all this we shall not have reached the end of our desires, for the field is so large and so attractive that it cannot readily be covered.

Having thus improved our methods of preliminary work through the introduction of progressive manipulative instruction, in the first instance, and later made material progress in the methods of teaching in the class-room and lecture hall, it seems to me that that time has arrived when our efforts should again reach out toward the accomplishment of something that may not only benefit ourselves and our classes, but the mass of the profession as well.

What shall it be?

In what way can we hope to benefit the practitioner, as well as the student and teacher, and in doing so help to place our calling upon a higher plane and give it the increased respect which we all desire it to possess?

The answer to this question seems plain.

We claim for our profession the attributes of both a science and an art. No one questions its claim to being an art, but assuredly it still lacks some of the qualifications that entitle it to the credit of being a science.

Scientific it is in a general way, because it is "knowledge reduced to law and embodied in system," but knowledge can never be systematic in its fullest sense unless it can be expressed and conveyed to others in exact terms. In this respect dentistry is not scientific, as we all know, for very many of the terms we use are not philologically correct, neither are they exact or properly expressive. It would seem, therefore, that the greatest need of our profession to-day is a satisfactory terminology. We need not consider the ways in which inexactness has crept into our professional vocabulary, for all arts and sciences in their infancy have suffered in the same manner, but we can and should address ourselves to its correction.

I would, therefore, propose that our organization set itself the task of revising our nomenclature and placing it upon a scientific basis. No other body could do it as well, for we are all teachers, and naturally the ones most interested in the subject; besides, once accomplished, we could more quickly bring about its general adoption by the concerted use of it in all our schools and in the literature to which most of us are frequent contributors. Editors and other writers would gladly adopt it, and little time would be needed for its general acceptance. All of our literature would be enriched by it, and our professional plane greatly elevated in consequence.

The undertaking would be a great task, requiring much time and effort, but it would or should be to us a labor of love, and love makes all tasks easy. As we know, previous attempts have been made in this line, and they were productive of much good, but they were made under conditions which failed to secure or to compel adoption.

At the Columbian Dental Congress, in 1893, Dr. G. V. Black presented a most admirable and well thought-out system, covering much of the ground in a very satisfactory way. It was, indeed, one of the most notable contributions to the Congress, and received nothing but praise from all of those present, but while it did enrich our terminology to some extent, only a meagre portion of its admirable suggestions were ever generally adopted. This was because it was presented to a general body and left with them to carry out or not, as they pleased. In the nature of the case there was not and could not well have been any systematized way of injecting its provisions into our literature while the subject was fresh and our enthusiasm alive.

Some years later interest in the subject of nomenclature was aroused in another body, educational in character, the National Association of Dental Faculties. A committee was appointed, of which your speaker was chairman, to revise the nomenclature then in use by our profession and to present the result of its labors in the form of a report at each annual meeting. The committee devoted months of hard labor to its work and submitted two reports in successive years. They were well received and elicited much interest at the time, but, soon after, the *personnel* of the committee was changed, little work was done, and the matter was pursued no farther.

Unfortunately, in both instances, very few reprints of the communications were issued, so that those who did not possess a copy of the transactions were without a full knowledge of the committee's recommendations. In very many instances copies of the reports were solicited by letter, but they could not be supplied, for they had not been arranged for at the time of publication.

The mistakes of the past must be avoided in the future.

Should this body decide to enter upon the work suggested it will have to be done in a thoroughly systematic way and the results be given the greatest publicity, in order that the profession at large may be benefited in as great a degree as possible.

In order to bring the matter before you in a manner to be readily considered and acted upon, permit me to outline a plan of procedure which would seem to promise good results. It is merely suggestive, and can probably be greatly improved after a general interchange of views.

First, there should be a general head to direct and superintend the work, make suggestions, oversee all that is done, and confer frqeuently with the commission.

The commission should be composed of three, five or seven members. On it would fall the larger part of the work to be done. Its duties should consist of receiving the lists submitted by the committees, considering them carefully, making any desirable changes in the definitions, orthography, choice of terms, etc., and arranging all matter in form for the yearly report.

This commission also should be empowered to select the members of the various committees.

There should be nearly as many committees as there are subjects in the dental curriculum, and each committee should be composed of three or more professors who are teachers of the branches.

Each committee would compile an alphabetical list of all the principal terms employed in their branches and give the generally accepted pronunciation and definition of each, making such notes in connection therewith as may seem desirable or necessary.

In some cases it might be best to assign to each committee the consideration of two such subjects as are usually taught from one chair, as anatomy and surgery; pathology and therapeutics; etc.

As there are about a dozen individual subjects comprised in the curriculum, six or eight committees would have to be appointed, but all would not need to be appointed or set to work at once.

It would be better, and would insure more satisfactory results, if but three subjects were reported upon at each annual meeting. The discussion of each report in open meeting should be as full and free as possible, and plenty of time be allowed for it. Indeed, the consideration of the report should be one of the principal features of the meeting.

After the adoption of the report, and when it is being printed for the transactions, four or five hundred reprints should be made, in order that they might be sent to the various schools, the editors of dental journals, the different state examining boards, and to any members of the profession desiring them.

By taking up and considering a few subjects at each of our annual meetings, as proposed, the entire work could be completed in four years, after which all four reports should be compiled in one pamphlet and given the widest distribution possible.

I might further suggest that the committee for the year send its report to the commission not later than the first of May or June, and that the commission in formulating its reports should arrange the various terms both alphabetically and according to subjects. This would simplify the matter of reference and add to the value of the work.

An appropriation of fifty dollars a year would probably cover the item of clerk-hire.

In conclusion, I congratulate the Institute upon the prospect of an interesting and profitable meeting, and trust that our deliberations may result in permanent good to our schools and the general profession as well.

Discussion.

Dr. F. D. Weisse, New York

I listened to the address of our President with a great deal of pleasure, and think that the same should not be discussed impromptu. The suggestions embodied are of great importance, and I would move that the address be referred to a committee of two to report a digest or summary of the main points for discussion, acting in conjunction with the President himself. The time for the presentation of the report could be determined later.

The Chair appointed Dr. F. D. Weisse and Dr. T. W. Brophy, of Chicago, as such committee. At a later stage of the meeting Dr. Weisse reported as follows:

Dr. F. D. Weisse, New York

A great deal has been talked about since this address was read. I ask, therefore, that I may be allowed to read the basis of our President's suggestions before we take them up for discussion; and, indeed, many gentlemen now present did not hear the address.

(Dr. Weisse read the suggestions contained in the President's address as to a satisfactory terminology of the different parts of the curriculum and a proper nomenclature.)

After due consideration your committee decided that it would expedite matters if they present to you their reflections and consultations upon the suggestions embodied in our President's address as their report. The question of anatomy nomenclature is at present under consideration by the anatomists of the world. Physiology and chemistry nomenclature has been taken care of. Dental nomenclature has had no special attention given to it, and as our President has said, this body of all others in the United States should give it careful and authoritative consideration. Your committee advise: That the suggestions in our President's address be put in operation during the coming year; that a commission of three be appointed—as small numbers are best to conduct committee work; that the chairman of that commission will be the editor of the work, or, as the President expresses it, the general supervisor; that committees be appointed by the commission, selecting gentlemen who teach the subject that they are assigned to; that the latter submit their views to the commission, after which the committees and the commission can come to conclusions as to what they will adopt; that the editor, or general supervisor, shall then formulate these conclusions and present them as the report of the commission at our meeting next year for the consideration of the Institute as a committee of the whole. The question arose whether it would be advisable to take up more than one department for the coming year. The committee decided that this work of nomenclature cannot be accomplished in a hurry; it will require some years to carry it out. Therefore, it seemed better to take up but one department this coming year. Your committee would therefore suggest: That during the coming year one dental department be taken up; that the department to be worked upon be selected by vote of the Institute; that the committee be appointed either by the President-elect, or by vote.

Dr. T. W. Brophy, Chicago

There is a slight difference of opinion between Dr. Weisse and myself, but it is of little consequence. I believe that the best interests of the Institute would be subserved by having three subjects at least—possibly one to be reported on next year. I see no reason why there should be any delay in beginning work on at least three. I think the doctor has a list in his pocket showing how we arranged these subjects: First, operative dentistry; then the prosthetic dentistry, including crown and bridgework and orthodontia; and third, dental pathology, therapeutics and materia medica. When these committees are appointed they may go to work, and if it is impossible to hear reports from all next year, the presentation of one and the discussion of the changes in that one line of nomenclature may be fully discussed. I think the President has done a very great and lasting service to the profession in giving us these suggestions. It may not be known to you all that at the meeting of the International Dental Federation, held at Hanover in August of this year, an international commission was appointed for the consideration of this subject of nomenclature. Whatever we may do, I am sure will be done in a way to contribute largely to the work of the international body. I do not know whether in England there is in the British Dental Association a section or committee whose duty it is to consider the subject of nomenclature. In any event, we will all work together to achieve one result, and that is, to improve our nomenclature, which so much needs improvement.

Anesthesia: How it Should be Taught.

By Hermann Prinz, M.D., D.D.S., St. Louis, Mo.

The teaching of anesthesia in dental colleges should, for teleological reasons, be embodied in the last year's studies of the curriculum. Prior to entering upon a detail study of this important branch of dental training it is necessary for the student to acquire a comprehensive knowledge of the fundamental teachings of medicine. A full understanding of the therapeutical effects of the drugs employed as anesthetics necessitates a minute acquaintance with their chemical and physical nature, a working knowledge of anatomy, physiology and pathology and a sufficient conception of psychology.

As an introduction to the course proper, a few brief but concise lectures on the history of anesthesia will serve this purpose admirably. The all-important fact that an American dentist was the first successful administrator of a drug for the purpose of abolishing pain during surgical operations will forever be the pride of our profession and our country. Following this historical sketch, the law in its various conceptions relative to the administration of anesthetics should receive ample explanation. Great stress should be emphasized in a thorough discussion of the standing of the dentist as a member of a distinct profession and as a medical specialist, if such a distinction is permissible. At this opportune moment some light should be thrown on the important question: The dentist as an expert in the courts of law. While this very phase of the subject more properly belongs of the department of jurisprudence, it nevertheless bears a close relationship to the point in view. Dr. Edmund Noyes, of Chicago, Ill., recently read an interesting essay on this very subject before the last meeting of the Missouri State Dental Association, entitled, "The Administration of Anesthetics by Dentists," which is very noteworthy in this respect.

One of the fundamental laws of self-protection in the administration of an anesthetic requires that a third person should always be present at such moments, and that, logically, brings up the question of proper assistance. An admirable paper on this very subject by Dr. M. L. Rhein, of New York, entitled, "The Dental Nurse," is highly instructive and well worth reading. The preparation of the patient prior to the administration of an anesthetic is next considered, which is followed by a discussion on the armamentarium with a demonstration of the various appliances and apparatuses employed for and during anesthesia or as a means of safety.

The examination of the patient proper consists of obtaining as much as possible of his precedent history, a general inspection and palpitation, and the auscultation of the circulatory system. This physical examination should serve as a guide-post for the selection of the proper anesthetic. As a sort of preamble a short, selective review of the physiological functions of the brain, the respiration and the circulation, including reflex action, is now indicated. Pathological disturbances which are liable to bear a direct relationship to the action of the anesthetics must also be carefully noted. The secondary actions of the anesthetics, the accidents, the means and methods of their prevention, and the remedial agents employed for such purposes require much thought and careful consideration.

Reaching the anesthetics proper, the subject should, according to the mode of their administration, be divided into two definite groups, viz., general and local agents.

The discussion of the individual narcotic agents should now be taken up in rotation, such as chloroform, ether, ethyl chloride and ethyl bromide, their combinations, such as the A.C.E. mixtures, somnoform, etc., nitrous oxide and its combination with oxygen, and so on. Their chemical and physical properties and therapeutical effects should be demonstrated and, if possible, animal experiments performed, which will materially help in producing lasting impressions upon the mind of the student. A warning note should be sounded to be especially careful in experimenting with so-called "new and harmless anesthetic" compounds upon their own *clientele,* because it should always be remembered that no matter what the nature of the anesthetic is, if it is substituted in the organism for an element indispensable to life, it must eventually kill. The college extracting rooms furnish ample opportunity to demonstrate the anesthetic effects of nitrous oxide and those compounds which on account of their rapid action and comparatively little secondary effects are especially indicated for the shorter dental operations. Narcoses of chloroform, ether, and mixtures of a similar nature, are usually witnessed in the clinics of oral or general surgery.

The production of insensibility to pain in a circumscribed area of tissue is usually referred to as local anesthesia. This process may be brought about by the application of topical remedies or by means of hypodermic injection of certain drugs or chemicals which possess definite anesthetic properties. Since the introduction of cocaine into therapeutics, this phase of obdunting pain has gained much prominence in the hands of the dentist, and much of the dreaded horror of the operating chair has lost its significance.

Many derivatives of cocaine and synthetical compounds of a similar nature have been placed on the market within the last score of years. None, however, has successfully substituted this most valuable alkaloid. The danger of cocaine poisoning is materially lessened since the discovery of suitable agents which inhibit its toxic properties. I refer here to the various preparations of the active principle of the suprarenal glands. Besides cocaine, tropa-cocaine, the eucaines, stovaine, orthoform, and others, should receive suitable mentioning. The local refrigerants, viz., anesthetics acting by abstracting heat from the tissues, are valuable adjuncts under certain conditions. As a whole, local anesthetics should be considered very much from the same standpoint as the general narcotics.

In teaching anesthesia it matters little if the subject is treated as a course *per se*, or if it is classed under the headings of therapeutics or oral surgery, or if it is a part of the work of the demonstrator of extraction—only let the subject be taught in such a manner so as to receive its full recognition as an integral part of the dental curriculum. Dr. Noyes' inquiry into this question, as outlined in his paper previously referred to, has brought to light a rather deplorable condition of affairs, not only in dental schools, but medical colleges as well. There seems to be ample room for improvement.

The subject of anesthesia commands quite an extensive literature of its own. Aside from the many essays published in professional periodicals, which are by far too numerous to mention here, the following list comprises the more important and more recent publications

Probyn-Williams: " A Practical Guide to the Administration of Anesthetics." ,,

Luke: " Anesthesia in Dental Surgery."

A. de Preuderville: " Anesthetic Difficulties and How to Combat Them."

Hewitt: " Anesthetics."

Patton: " Anesthetics and Anesthesia.'

Underwood: " Notes on Anesthesia."

Probyn-Williams: " Golden Rules of Anesthesia."

Hewitt: " The Administration of Nitrous Oxide and Oxygen for Dental Operations."

Guilford: " Nitrous Oxide."

Hankel: " Handbuch der Inhalations Anesthetica."

Seitz: " Die Zahnarztliche Narkose."

Seitz: " Die Zahnarztliche Localanesthesia."

Thiesing: " Local Anesthesia und ihre Verwendung in der Zahnarztlichen Praxis."

Peckert: " Ueber Localanesthesie."

Sauvez: " L'Anesthésie Locale Pour l'Extraction des Dents."

Viau: " De l'Anesthésie en Chirurgie Dentaire par les Injections de Cocaine."

Pérez: " Estudio Sobre Anestésicos Locales en Odontologia."

Nevius: " The Discovery of Modern Anesthesia."

McManus: " Notes on the History of Anesthesia."

Discussion.

Dr. T. W. Brophy, Chicago

At the conclusion of the morning session, the President and the two gentlemen who were appointed as the committee on Dr. Prinz's paper, requested that Dr. Oliver and myself act as the committee to whom the paper should be referred. We have taken it up, and I may briefly state that while we have not formulated any statement, we think the phases that should receive our attention are those bearing chiefly on the use of anesthetic agents. Summarizing the paper, we find the doctor speaks first of lectures to be delivered on the history. He says " a few lectures." It is my opinion that one lecture on the use of anesthetics and anesthetic agents is sufficient; I hardly see the advisability of giving a number of lectures. They may be read by the student, and the use of those agents demonstrated. The subject in the main is a very important one. The medico-legal aspect has claimed considerable attention of late, and it is still one that has not been settled in the minds of many.

Just how far a dentist should go in the administration of anesthetics has been a question of difference of opinion among men. I believe that the dentist has just as good a right, legally and otherwise, to administer anesthetics as a physician, and in order that he may exercise that right if it were questioned in court, the answer must come as to his qualification. It must be settled as to how thorough his instruction has been; and that brings us to the question of physical diagnosis—the capacity to recognize those conditions in which the administration of anesthetics is contraindicated—what physical condition of the heart, the lungs and the nervous system would make it improper to use an anesthetic. Legally the dentist must be qualified to have that capacity; otherwise he must call to his assistance a medical practitioner who is qualified. If the medical practitioner is not qualified, he is not helped at all; so that must be considered. The dentist must have knowledge of the signs of physical disease; how to make examinations of the secretions; how to determine whether renal diseases exist, which would contraindicate the use of ether or other anesthetics. The student should be taught not only these physical signs of disease, but how to conduct the procedure of administering anesthetics—how to select anesthetics best adapted to special cases; how to administer them with the highest degree of safety; how to make use of remedial agents to resuscitate a patient who may fall into collapse. This he must be taught and must know, else he is open to prosecution and punishment for the want (as the courts put it) of the ordinary skill that is necessary to conduct the administration of anesthetic agents. He must be familiar with all the remedies employed in resuscitating a patient, the question of artificial respiration; and when the patient is on the verge of collapse, how to resort to agents to revive him. This must be taught with that degree of care that would be employed in teaching him how to insert a gold filling—not by a lecture, but by practical demonstrations, that he may see exactly what to do under certain conditions. For that reason, of great value to the student is the surgical clinic, where this is demonstrated all the time. While this is not exactly a report of the committee, it is some matters we have reviewed. One feature of the use of anesthetics in dentistry I deplore; and while it has nothing to do with the teaching of the students, it is part of their instruction. Dentistry has cheapened the use of anesthetics, has reduced the fees for the use of them to insignificance in no sense adequate to the risk and responsibliity and care that must be employed to properly administer them. That stands in the way. The profession seems to be deluged now and then with those agents, advertised extensively in a way that is not in strict accordance with fact, because those who put them on the market declare they are harmless. There never has been a patient anesthetized in this world to a state of complete anesthesia who has not been placed in a dangerous condition. Every time an anesthetic is administered, no matter what it is, the man who administers it is taking upon himself a great responsibility, and the possibility of the collapse and loss of the patient. I have lived with anesthetics most of my life. I have administered them thousands of times, and yet the older I grow, and the more I do in the use of them, the more I feel the responsibility, and I never administer an anesthetic without a feeling that this may be the patient that may go. I regard Dr. Prinz's paper as an excellent one. It is one that might occupy the time of this association all day in discussing it; and if we were to enter into detail as to the method of administering anesthetics, which the paper does not call for, it would consume several days. It is enough to say that our schools in the past have not given the subject the thought its importance deserves. The schools have not dwelt sufficiently on the question of physical diagnosis, and when our young men go out to enter on the very great responsibility of being practitioners, the question of administering anesthetics must be considered. We regard anesthetic agents a kind of heirloom in our profession, because the world is indebted to the dental profession for this great boon to suffering mankind—the presentation to it of artificial anesthesia. So it is ours; we need not appeal to any other profession to know whether we have a right to use our own; but we must qualify ourselves to use our own, and qualify the young men who take upon themselves this great responsibility of life, so frequently is the administration attended with the loss of a patient. We read too frequently that a patient died in the dental chair. The question of position is very important, how to pose a patient with the greatest degree of safety; and we must impress upon our students that they should never administer any anesthetic—it would be better to say even nitrous oxide gas—in an upright position. Better let the patient recline backwards, and especially should this be done in the administration of chloroform or ether. As to local anesthetics—cocaine—I do not know much about it; I might say I do not know anything about it. I have never seen a man (and I have talked with many) who can tell you what the minimum dose is that may be used with safety. They do not know, because a patient will sometimes collapse when a fraction of one per cent. is used. So I say, and if I am wrong I would be glad to be corrected, I do not know the man who can tell how little can be administered with safety. Therefore, I do not use it; I do not like to use a thing that I know nothing about. We are deluged with these proprietary remedies or anesthetics. It says in the journals, "May be used with safety," and our students are trained in a way to think they may use certain agents with safety. There is no absolute safety connected with the administration of any of them, and I wish I had the power of wiping out of the journals those advertisements set forth as sure cures, etc., because such statements are not true. We must train our students to guard against these things. It should be taught positively and specifically that they must not listen to those stories told by manufacturers of drugs, that certain things will "surely cure." We have a masterpiece in this paper of Dr. Hermann Prinz, who is always capable of writing masterpieces; he is a genius in his way. I feel greatly benefited by this paper in outlining how we should teach our students these subjects. It is one of the most important matters before the world to-day. Recently articles have appeared on the use of chloroform and its effect on the system. It has elements that bring about certain abnormalities of the liver leading up to fatty degeneration which perhaps some of us do not realize. I would like to state that Professor Bevan, of Chicago, has recently produced an article on the use of chloroform and its effects on the liver, that I advise you all to read. It is very valuable from a scientific point of view, as well as from a practical point.

Dr. R. T. Oliver, West Point, N.Y.

I have listened to this excellent paper with a great deal of interest and must commend its careful consideration to practitioners, as well as teachers and students of dentistry. It presents a subject that to a large degree fails to particularly interest the general practitioner of dentistry, because he seldom finds it necessary to use the agents of general anesthesia, depending either upon the patient's family physician or one of his medical friends or neighbors when a case presents requiring the use of such drugs. The phenomena of anesthesia and the specific effects of anesthetics upon the human subject should be taught thoroughly to all dental students, that they may have a good, comprehensive knowledge of the entire subject before leaving college and entering practice, where they are compelled henceforth to rely upon their own resources. We all know that, as a rule, students are prone to rely too much upon their professors or demonstrators as long as contact can be maintained with them, especially in regard to subjects that do not particularly interest them as dentists, or that seem to come within the jurisdiction of the profession of medicine. I am of the opinion—in contradistinction to Dr. Brophy—that a general history of anesthesia and anesthetics should be taught with this subject, going back to the most primitive methods of administering the first drugs used for the purpose and gradually coming up through the period of later discoveries, giving due credit and honor where it belongs, afterward dividing the subject into two parts, general and local anesthetics, taking up the individual history of each of these drugs and then going into the minutest detail as to their specific actions, effects, methods of administration, good and bad results, methods of resuscitation, etc., taking particular pains to explain the bad results, for while almost any one can handle an easy case, the most skilled amongst us would hesitate to care for a bad one. It seems to be a recognized fact that the administration of a general anesthetic in a dental chair is fraught with more than the usual amount of danger, due entirely to the poor position the patient is required to assume in the effort to get the head into a convenient position for more dexterous manipulation. Our medical brethren have long since called us "fools" to run such risks, and until we adopt some means of using either a perfectly prone position with our chairs, or a surgical table for extracting teeth or performing the usual simple surgical operations within the oral cavity, we must expect to be censured in the above forcible manner. I believe lectures on this subject should be immediately followed by demonstration before the class, in which the student may see the actual conditions produced by the drug, the method of its administration, and the methods and means of resuscitation, both by Sylvester's method and the use of drugs as heart stimulants. In my opinion the question of local anesthesia, in so far as pertains to the practice of dentistry, especially to the extraction of teeth, should receive special study by our students. We all know that many of our familiar drugs or their compounds are efficacious agents to painless operations. I am not in favor, however, of hastily taking up new and unknown remedies, mostly proprietary compounds with secret formulas, where a lack of knowledge of the constituents renders the operator absolutely impotent and precludes his ability to combat the baneful effects that may occur. It is rather doubtful if any court in the land would exonerate a man from blame, not to say criminal carelessness, for fatal termination of a case following the use of a local anesthetic, the ingredients of which he knew nothing of. As we can never tell exactly what the effects of a local anesthetic will be, we must be prepared to meet the unlooked-for results and successfully combat them, in order to save, perhaps, life, reputation and future peace of mind.

Dr. T. W. Brophy, Chicago

I want to speak of the importance of having a commission or a committee of this body to whom all these matters can be referred for investigation, they subsequently to report. We are being deluged with pharmaceutical preparations, and this body should have a committee for the purpose of making a careful investigation of them, and report the findings, so we may know all about them, and not have men all over the country guessing at them or depending upon the statements of the manufacturers.

Dr. A. G. Friedrichs, New Orleans, La.

I did not have the pleasure of hearing the paper, but I think we should teach this branch as thoroughly as possible. When it comes to the demonstration of any general anesthetic, we ought not to fill our students full of presumption and let them try it. I graduated in medicine, and I have administered chloroform and other anesthetics, and I tell you candidly I do not know how it is that I did not send some of these poor unfortunates to the realms beyond, with my knowledge of anesthesia at that time, and I was an intern at the Charity Hospital of New Orleans for two years. The method of administration of anesthetics at that time was of such a character that it would be considered to-day absolutely criminal. Of course we ought to instruct our students, and of course you will say we do, and God knows I do in our school; but that will not make anesthetists of them. They cannot get sufficient general experience to be able to carry on this subject with discretion, not to say with skill. I think we had better not fill them full of presumption, as I said before, and let them go out and handle this subject, because they will live to regret it. Thank God I was preserved from the regret portion of it, but as I stand here, and know the modern methods of handling these drugs, I do not know how it was, except the Lord preserved me, that I did not send some poor unfortunates into eternity.

Dr. F. D. Weisse, New York

The paper read this morning is a most admirable syllabus of the subject of anesthesia as it should be taught to students. As bearing on anesthesia Dr. Brophy said "that students should be taught physical diagnosis." I would go only a certain distance with the doctor on that point. As a matter of fact the dental student has neither the time nor the opportunities to so familiarize himself with the phases of physical diagnosis as to make it absolutely useful to him in deciding as to the administration of anesthetics to a given patient. To be a physical diagnostician, able to place his ear to a chest and say, positively, "This patient can or cannot have an anesthetic administered to him," one must have a trained ear in normal and abnormal conditions. I believe every dental student should be trained to recognize a normal heart's action, normal respiration and a normal pulse. This can be accomplished because he has his fellow students upon whom these conditions can be realized. At the New York College of Dentistry students have for many years been trained in this way. One who has realized what the normal should be, if he puts his ear to a chest, or his fingers to a pulse, and hears or feels something that he did not hear as normal heart's action or respiration, or feel as a normal pulse, he can send the patient to a physician for diagnosis of the cause therefor before administering an anesthetic. We do not think the dental student can be advanced beyond the appreciation of normal conditions. The all-important question of resuscitation is called for in given conditions; therefore, the dental student should be taught all agencies and procedures used therefor, more especially the several methods of artificial respiration. At the New York College of Dentistry students are thoroughly drilled in applying to each other the several methods of artificial respiration and the administration of restorative remedies by hypodermic injections and the use of all other means are dealt with. I had a peculiar experience in being called upon to act as one of a medical jury, in the case of a dental surgeon here in New York in whose office a patient died during the administration of nitrous oxide. It gave me an insight as to the legal responsibility in the administration of anesthetics, namely, what a practitioner was called upon to answer. The unfortunate dental surgeon was *sifted:* As to what theoretical knowledge he had of anesthesia? What experience he had had in the administration of anesthetics? What he knew of the methods of treating a patient in case of an emergency? Whether he had a battery in his office, ready for use, and this, that and the other remedies to meet emergencies? He was examined as to what he knew about artificial respiration and if he ever had actually practiced artificial respiration upon a human being? It was found that he did not have any means of resuscitation in his office, and he exhibited an entire *innocence* of what to do in case of an emergency. He did not even know whether to lay a patient flat on his back or to sit him up. This occurred some twenty-five years ago or more. The students should be told: "When you take the responsibility of administering an anesthetic to a human being you must have everything at hand for any emergency that may occur, and you must possess the knowledge of what and how to apply means and methods to meet the same. If you do not and cannot fulfil these requirements, and anything happens to your patient, you will be held legally responsible, and when you are before a jury in a trial for malpractice, you will be asked if you had all necessary agencies at hand for emergencies, and it will be determined as to whether you know what and how to apply restorative measures in given conditions." I have always had misgivings as to whether it is altogether right to foster too much presumption of ability on the part of the dental graduate to administer anesthetics. I hold that we should teach that the dental graduate should never administer chloroform or ether. Let the patient's physician endorse the administration of either of these agents and let him administer it, the dental surgeon performing the dental operation for which the anesthetic was called for. As to nitrous oxide, its history makes it, for the dental profession, their peculiar anesthetic. When we realize the thousands of cases where it has been and is administered without accident, we are justified, as institutions, to commend its use and to educate our students how to administer it. As to local anesthesia, except by freezing, I am afraid of it. As Dr. Brophy has said, " What is the minimum dose to be given to the man who walks into the office?" Cases too often occur where a patient has to remain in the office the balance of the day, and sometimes the night, in recovering after accidents from using cocaine. In closing, I ask the gentlemen present if they think our institution would be justified in sending out our graduates with the statements to them: " You can use cocaine with perfect safety in your dental operations. Use it so and so. You will have no accidents from it."

Dr. A. G. Friedrichs, New Orleans, La.

I have collected statistics of over 30,000 cases of cocaine anesthesia. I began its use hypodermically, when there was only a French preparation—a green-looking powder—which was donated, by-the-way, it being very expensive, and worth about $300 an ounce at that time. I used that vile stuff in a saturated solution. I had a clinic in the Charity Hospital at that time, and I still have a clinic at that institution; I do not remember just how long ago it is, but certainly over twenty-four years. That same agent was used in a 20 per cent. solution at the Nose, Ear and Throat Hospital for removing growths in the air passages, but it had to be abandoned because of the deleterious effect it produced. I used it hypodermically, without any idea as to the effects. We were living in the atmosphere at that time as to the beauties of this anesthetic agent. I injected it in various quantities—of course it depended on the construction of the gum tissue. If there was considerable connective tissue, the patient got a good dose; if it was dense and resistant, he did not get as large a dose. It averaged from five minims to twenty. There is another instance where Providence has stood in good stead for me. I look back at that experience with fear and trembling. It looks like a chimerical apparition. I was brought to a standstill by the first reported death from cocaine anesthesia, and that was for removing some hemorrhoids. The doctor, an Italian, in his clinic in Naples, had injected about three ounces of a saturated solution of cocaine in this poor unfortunate's rectum. He never did more than turn over. Any one who has followed up the history of cocaine will remember this, because it gave the medical profession a sudden jolt. We were living in this beautiful atmospherical hallucination which I described to you. Mertz was the first man in the field to get up the crystal in its pure form. Then we began to appreciate the fact that cocaine was really a dangerous agent, and that some people died from its administration. I began to reduce the percentage of my solution. I began first with a 20 per cent. solution, using five minims. Of this solution I made as many as three thousand injections a year in the Charity Hospital alone, and I never have had an untoward result, and this number of applications was kept up for over twenty-five years, gradually reducing the percentage until to-day I never use more than a 2 per cent. solution, which I find of sufficient strength to give the best result without risk.

Dr. J. H. Kennerly,
St. Louis, Mo.

Dr. Weisse says the essayist failed to say anything about the necessary remedies and precautions that should be taken. He does say in his paper that the necessary precautions should be taken. I simply want to say in defence of the man who wrote it, that he can give you even a better paper on precautions than he did on this subject, and you would all think so too if you could hear him in his classes and see the anxiety the man places upon teaching his students the all-absorbing thought of the care that should be taken. It seems to be a load upon his shoulders. I thought I would take this opportunity to thank the gentlemen on behalf of Dr. Prinz for their kind acceptance of his paper before this body. He is earnest and honest, and if you should want a paper on the preventatives, I am satisfied he would be more than delighted to give it to you.

Dr. R. T. Oliver,
West Point, N.Y.

The remarks of Dr. Friedrichs upon the follies of his past life are truly refreshing. His claims to closer kinship with his Maker must be true, for he states that although having administered anesthetics on an average of over ten times a day for the period of one year, he has never experienced any bad effects. Would that some of the rest of us less fortunate ones knew the secret of that "closer affiliation." I have always been a "stickler" for teaching anesthesia and anesthetics to dental students, as thoroughly as medical students are taught, for they are certainly just as capable of learning, and in a measure will have just as many opportunities later to resort to the use of these dangerous drugs as the average medical practitioner, with perhaps a great many more cases for local anesthesia. Therefore, we should prepare them as best we may to meet these opportunities, for we know that as soon as the student leaves college he will begin to do as he pleases in this regard, as with other things in which he has been schooled (ethics, for instance), and if he finds a competitor across the street who has built up a good practice through medium of painless extraction with a local anesthetic, and realizes he has not learned anything about such drugs, he immediately begins to look with discredit upon the shortcomings of his Alma Mater. So let us do with this subject as with others of our curricula, teach it thoroughly, that students leaving our institutions may be as well equipped in the fundamental knowledge of their life's great work as it is possible to make them.

Dr. F. D. Weisse,
New York

I regret that my remarks could be construed that I have any doubt as to the ability of the dental student to learn all the medical student can learn. I realized many years ago—from the dissecting room to the final examinations—that a dental student can achieve as much in any work or on any subject as a medical student; but I repeat that dental institutions should not give the dental graduate the idea that he is authorized to administer general anesthetics other than nitrous oxide. In continental countries abroad the law does not allow the dental surgeon to administer a general anesthetic other than nitrous oxide, except in the presence of a medical graduate.

Dr. A. R. Starr,
New York

I think Dr. Weisse leaves a wrong impression in your minds. The students in the New York College of Dentistry are taught the use of cocaine, but cocaine has not been administered hypodermically in our infirmary because of the risk run in allowing students to handle such dangerous drugs, and on account of the danger of bad after-effects. They are taught these methods theoretically, but not clinically. They are taught how to treat accidents that may arise from the use of those remedies. They are also taught that there are comparatively harmless solutions which can be used hypodermically for the same purpose, such as the saline solutions or peroxide of hydrogen.

Dr. H. T. Smith, Cincinnati, Ohio

We have found in the Ohio School that it is advisable to divide the subject of anesthetics, together with that of extraction, into two different years. Extraction of the teeth is taken up by the freshman students, and carried through the entire freshman year. After the holidays the subject of nitrous oxide is presented to the freshman student, because in his extracting work he necessarily comes in contact with this anesthetic. The subject of general anesthesia, chloroform and ether, and the other general and local anesthetics, is taken up as part of the oral surgery lecture scheme in the third year. We feel that the freshman student coming into the extraction room as he does, and observing extractions under nitrous oxide, should be made familiar with that anesthetic. When the subject of nitrous oxide is presented to him, he is given its history. If in any dental school, at any time, we have an excuse for teaching dental history, it is certainly in connection with nitrous oxide. Dr. Brophy mentioned the term medico-legal. It occurred to me, and as a suggestion for our committee on nomenclature, that the term "dento-legal" might be used in that connection. One of the difficulties we encounter, in teaching anesthetics, is the lack of a text-book that covers the course satisfactorily, but that is also true of many of the departments in the dental college curriculum. We need a book somewhat smaller than Turnbull's "Anesthesia." In England there have been published two excellent ones on the subject within the last year or two. Such a book should devote several chapters to physical diagnosis, and the subjects of general anesthesia and physical diagnosis might be considered together, with advantage, by the teacher of oral surgery.

On motion, the subject was passed.

Prosthetic Dentistry: How it Should be Taught.

By Ellison Hillyer, D.D.S., New York.

The sole object of our papers and discussions, as I understand it, is to seek by comparison of methods the attainments of the best results by both teacher and student.

For the purpose of giving you a brief *résumé* of all that has been presented upon this subject before this body, I have reviewed the proceedings and find the following:

1894. " Outlines of a Course in Prosthetic Technic," by Dr. Wilson.

1895. " Orthodontia and Bridgework Technics," by Dr. Bailey; " Metal Plate Technics," by Dr. Wilson.

1896. " Outline of Course of Prosthetic Technic at the University of Minnesota, Dental College," by Dr. Bailey.

1897. " Prosthetic Technic," by Dr. Hoff.

1898. " Prosthetic Technic Syllabus Committee Report."

1899. " Prosthetic Technic Syllabus Committee Report"; " Orthodontia Technic," by Dr. Case.

1900. " The Use of Flexible Rubber in Orthodontia and Other Technic Teaching," by Dr. Byram; " Technic of Crown and Bridgework, Metal and Porcelain," by Dr. Weeks.

1901. " Teaching of Prosthetic Dentistry," by Dr. Wilson.

1903. " Teaching of Orthopedic Dentistry," by Dr. Case; " Orthodontia Technology," by Dr. Guilford; " Method of Teaching Anatomical Arrangement of Teeth," by Dr. Cigrand; " Method of Teaching Artistic Elements of Prosthetic Dentistry," by Dr. A. O. Hunt; " Porcelain Technology," by Dr. Goslee.

1904. " Practical Course in Soldering," by the present writer.

In two of these papers, those by Dr. Hoff and Dr. Wilson, the general subject was treated in a very able manner. In the remainder, special subjects were considered.

In 1897, Dr. Hoff gave a most admirable presentation of the subject entire, with detailed description of technic teaching procedure to date. Four years later Dr. Wilson repeated the effort with equally satisfactory results. Four years more have passed, and I now take up the general subject with but one motive, viz., to ascertain by common discussion the present status of this branch of our curriculum.

Dr. Hoff eight years ago named as subjects to be taught in the prosthetic technic laboratory: Plate, crown and bridgework, the manufacture of instruments and regulating devices, splints, and cleft palate appliances. Such progress has been made along certain lines during the past few years as to make it necessary to " change our chart."

We should give the student that which will best fit him for practice. The accumulation of requirements—unless it is desired to fill the student's time—should be limited to the most practical and " up-to-date " variety, while all others should be treated in lectures from the rostrum.

Orthodontia is naturally becoming a subject apart. It has almost, if not quite, passed into the realm of post-graduate study, at least for anything like perfection of preparation. We must, however, teach the technic of appliances and cover the literature didactically from the rostrum; the student must apply practically the principles taught in a much more thorough manner than can well be applied in the infirmary or clinic.

Porcelain has progressed to a position where it demands a place entirely by itself. This was thoroughly demonstrated by Dr. Goslee, at Buffalo in 1903, when he gave us his excellent paper on " Porcelain Technology," showing the absolute need of a continuity in procedure through inlays, porcelain crowns and bridges, and continuous gumwork. This makes an " overlap " of the prosthetic and operative departments, yet one infinitely to be desired for the benefit of the student—the one whose interest should be paramount to every other consideration.

With these divergences the course remains the same, practically, as in years gone by except for the detail of its development in methods.

The number of these is legion, as no two schools can well teach exactly alike, the needs of one being entirely different from those of another. While some find it wise to require certain specimens of technic work to be performed by the student, allowing him his freedom as to hours and manner of accomplishment, so long as he presents it complete at the end of the term, others make large divisions and carry the student along in the laboratory under general supervision of a demonstrator; still others divide the class into definite small sections which are for a certain number of hours strictly confined to a certain piece of work under the personal direction of an instructor. This method seems the best one in many respects.

If it were possible to arrange *all laboratories* in such a manner that one instructor could be provided for every ten men, and these men be supplied with work benches in three-sided groups—the instructor within the group and students upon his right and left hand and in front of him—we could probably obtain the most satisfactory results.

My contention is that too much personal attention cannot be given a student in dental prosthesis. The student appreciates the close contact of his demonstrators. It is hard to impress this upon some instructors. There is no school for the training of dental teachers, and nothing but long experience or born aptitude can fulfil the requirements. Nothing, however, can give a teacher more satisfaction than the natural response which comes from a student upon receiving this personal attention. I do not believe in a teacher doing any part of a student's required technic work during demonstration; indeed, when this work was in my care it was my custom, if it seemed absolutely necessary, to demonstrate to a student by doing his work, to either destroy the work done or to require from him a duplicate.

Another great help in class work is the syllabus in conjunction with " step specimens." Each specimen of required technic work is definitely described. Every step in the specimen is explained in detail so that the student—each receiving a copy—has at hand a definite guide as complete as if the instructor were continually present at his call.

Such a syllabus is not a very difficult matter to prepare, and once provided may be used indefinitely with additions or omissions at will.

The teaching of prosthetic dentistry should not be confined to the technic laboratory and lecture hall; the class work being completed, the student, as soon as possible, should advance to practical work; the first-year men to repairs; the second-year men to crowns and bridges and the simpler dentures; the third-year men to more complex dentures, splints, obturators, and practice of orthodontia.

Toward this end, it is advisable *to require a minimum amount of work* and *to give every inducement to the student to assume a maximum amount,* allowing credit upon practical work to offset a similar requirement of " practice " work remitted.

Another great aid in teaching this subject is the regular weekly "prosthetic dentistry clinic." With us, this is the evolution from a weekly examination of dentures, presented by second and third-year men for passing or graduation, to what is now a largely attended clinic to which come every conceivable kind of oral deformity for advice and treatment. Not only is this extremely advantageous to the student, but also to our graduates it affords a means of bringing them back to Prof. Littig, whose greatest pleasure seems to lie in the amount of good he can do for all who are, or ever have been, under his genial supervision.

Also, at this clinic, the oversight of all difficult regulating cases is retained from week to week—advice offered and progress watched.

While perfection in technic operations is exceedingly commendable, the more practical instruction we can supply the student, the more finished product we will be able to present at the time of graduation.

Discussion.

Dr. J. Q. Byram, Indianapolis

I wish to compliment the essayist on the paper. I regret very much that I did not have an opportunity to study the paper more thoroughly, but I had the pleasure of reading it while Dr. Friedrichs was telling of his experience with different anesthetics, so I did not get as much out of either as I should. Probably there is nothing in the college curriculum quite as hard to teach as some phases of prosthetic dentistry, and that is especially true of plate work. In the last ten years we have built our operative clinics at the expense of our prosthetic clinics, and in order that we may teach our students to practice dentistry as we would, it has been necessary to extract fewer teeth, and consequently we are making fewer dentures. Therefore it is the hardest thing to teach and give the student the training he should have. I believe all agree that in teaching practical subjects in operative and prosthetic dentistry, as crown and bridge work and porcelain work, there is an overlap on operative dentistry, and it is very difficult to teach certain phases without encroaching on the rights of other professors; but we have little trouble in that line. I wish to emphasize the essayist's point regarding personal attention in this branch.

There is really no branch in the institution that requires as much personal attention as the prosthetic, because it is nearly all mechanical, and some of our students are not natural mechanics; consequently it requires a great deal of personal attention in order to cultivate the requisite amount of skill. Just how much technic should be given, is hard to say. I would say give all that we have time to give. I like the suggestion offered by the essayist, to excuse the student from certain operations in technic if he does them in practical work. I think there should be a closer relation between the technic department and the practical department. Encourage the student to do all the practical work he can. I find certain students would rather do technic work than practical work, because they are timid. The essayist has mentioned the subject of porcelain work, and I will take students a thorough course in porcelain technology. I am convinced we can give them but little practical work, but I believe the liberty to say a few words along that line, as I am particularly interested in it. We are all agreed that we must give our the seniors should have a very thorough course in technic. In the institution which I have the honor to represent, I give the seniors two lectures each week, beginning with the history of porcelain, carrying through the manufacture of porcelain, etc., taking up the carving of teeth, the mould formation, the application of colors, the baking of teeth and the study of colors (and I would be glad to have you inspect my exhibit in that line). I use water colors, starting with the primary colors, red, yellow and blue, and have the student form many colors to show what he can do. I then have them take red, yellow and blue porcelain and fuse different combinations. It trains the eye to detect delicate shading, it gives them experience in fusing and teaches them to manipulate a small amount of the material. I have found it one of the most valuable courses I am giving. There is one point to which I wish to call attention, and I think the essayist will agree to it, although he did not bring it out. That is, regarding syllabi. I am not altogether in sympathy with syllabi. I believe whereever possible the student should receive his didactic teaching prior to his technic teaching. I make it a point to have our students do an operation immediately after they have received a lecture on that operation.

Dr. R. M. Sanger, East Orange, N.J.

I am not particularly prepared to speak on this subject, as I did not see the paper until a few moments ago; but the subject of teaching prosthetic dentistry is one very dear to me. My own conviction is, that in the beginning of prosthetic dentistry, our line of teaching must be very much the same as that taught in manual training. The doctor said that few of our students are natural mechanics. I hope that is not true, because I believe the successful dentist should be a natural mechanic. I think Dr. Hillyer has truly said that the best method of teaching is personal contact with the student and personal demonstration at every state of the work as far as possible. I think it is necessary for this work to be done on the model over and over again. I wish to see my student able to make a first-class denture or a crown or a bridge on the model before he makes one in the mouth, if that is possible. I appreciate the fact that we need a good many intelligent demonstrators, perhaps more than our schools are able to have; but we should aim high, and come as near the mark as possible. While possibly there is an overlap between prosthetic and operative dentistry, it is not a dangerous one. I do not think a man can make a good operative dentist unless he is a good prosthetic dentist.

Dr. G. B. Snow, Buffalo, N.Y.

It is very well to get all the instruction we can as regards the practical points in prosthetic dentistry; but in order to give the student full knowledge of what he is undertaking, something more should be expected. The whole matter of prosthetic dentistry is making the best of a bad bargain. The loss of a tooth is no light matter. The tooth should first be filled; after that it will receive a crown; and after that, when the root is lost and the attachment to the socket gone, we put in a plate. That should be gone over before the student gets out of college. Then there is the adaptation to the mouth, the way in which the plate should fit the different structures, and the conformation of the plate to the different parts. This should be carefully studied in addition to the routine of the laboratory. As far as that is concerned, I think technical teaching in one place may be just as good as in another.

Dr. J. B. Willmott, Toronto, Canada. I understood that the subject was prosthetic technic. I want to very briefly call attention to two or three points. I am quite in sympathy with Dr. Byram's suggestion that a student should be taught didactically before we attempt to teach him practice. I have long had the conviction that before a man can construct anything he must have in his mind a vision of what he wants to construct. Just how he is to get that vision or idea may be a matter of difference of opinion. He may be called upon to examine a finished piece of work; then have it demonstrated to him. It is not sufficient that a student of dentistry should be able to construct a denture on a plastic or metallic base, but he should be able to construct it well. I do not think we give time enough to it. We have them construct a piece of a certain character, and then pass on and construct a piece of a different character. I think it should be repeated again in the second year. I had an opportunity of looking into the English method of teaching technic. I do not think we Americans give our English friends credit for what they do. It is not quite fair to say, taking it as a whole, that their institutions are very much below the general standard of the American institutions. In technic they quite outdo us. The man who graduates from a dental school there can construct a piece of metal work and use his blowpipe in a way that very few of the American students can do. I do not know what idea other men on this side of the Atlantic have, but I know I had the idea that they became dental students and went into the preceptor's office, not as an assistant exactly, but to assist him and observe his methods. They are apprentices pure and simple, and the present method is not to apprentice them to a private preceptor, but to one of the schools where they have a workroom fitted up, and a competent instructor who spends the entire time with that class, not exceeding twelve, for three years —six or eight hours a day. These unfortunate fellows (from their standpoint) do nothing but construct technic pieces, mainly on gold, and when they have them finished as well as they can, they are carried to the melting pot and refined, and the gold used to do the work over again. They acquire a knowledge in that way that very few of our American students get. They repeat and repeat until they become expert in the technic of prosthetic dentistry; but when it comes to applying the knowledge to the patient, they seem to be very far behind. During the first two years they never see a patient, and only occasionally during the third year. In the third year somebody brings them an impression from the hospital, as they term it, and under the direction of the mechanical man they construct a denture as we do in our prosthetic laboratories. They do not have the opportunity of adapting their technical knowledge to the patient, and in that respect they are wanting. I believe there is no fault to find with our prosthetic technic, except that we cover a good deal of ground, and repeat very little.

Dr. S. W. Bowles, Washington, D.C.

Each professor is apt to think his chair is the most important in the curriculum. I agree with Dr. Byram that perhaps this is the most difficult to teach, and if difficulty has any bearing on the importance, it is perhaps the most important. The manipulation which a student necessarily must have has a great bearing on prosthetic dentistry, and that is why it is so hard to teach. We really have to instruct them in their course of manipulation. I cannot differ with the paper in any point; I wish I could. There is only one point that strikes me in the teaching of prosthetic dentistry, and that is we are apt to give it a mechanical aspect. It seems to me the artistic or æsthetic aspect should be carried along with the mechanical, and I have found it hard to have any expression of the artistic side of the work in the student. The selection of artificial teeth with regard to form and color to correspond with the natural teeth is hard to inculcate into the student's brain. In my teaching I try to bring out the artistic as well as the mechanical part.

Dr. J. B. Littig, New York

I expected to have the gentlemen from abroad tell me how to teach prosthetic dentistry. That is what they came here for. I cannot differ from the paper; it would not be proper, because it came right from my own chair. In the first place, if we find that a man seems to have no mechanical ingenuity at all, we had better place him in the technic room and keep him there until we find whether he ever will have, by teaching him until he can construct something. If you find he cannot construct anything, if his work is entirely out of keeping with what it should be, a kind whisper in his ear that he had better study something else would be a very charitable thing for that man. There are many men who do not need the technic class at all. Put them to work in the mouth as soon as you can, when you find such. Why should we hold back a dozen fine operators and let them wait for others? Let them go ahead upon the practical work, and keep the laggards in the technic class until they do learn.

Dr. E. Hillyer, New York

I think I distinctly stated in my paper that the student should not take practical work until he has passed through the technic class, so that disposes of that point entirely. Also, that every specimen that a student is required to make is explained and shown at first. Every step is demonstrated. In regard to the time allowed, that is a grave proposition. Prosthetic and operative dentistry are to be a man's life-work, and we are constantly fighting for time in which to teach these subjects, crowded by other subjects which they are bound to forget to a degree in six months to a year. When are we going to settle this matter? We are fighting for time for our practical work. We are striving to get the students to do the work. Why? Because they are so occupied with other subjects in their technic classes. It seems to me we had better cut down on some of the other subjects, if not entirely drop them out. I leave it to Professor Willmott, is he not using as much time for his prosthetic work as he possibly can?

Dr. J. B. Willmott, Toronto, Canada.

Of course we give them all the time they allow us.

Dr. E. Hillyer, New York

In regard to the syllabus Dr. Byram spoke of, I simply mean that as a help. I do not mean that the student is to have that only to guide him in his work. It is there to save the instructor from repeating what he is bound to repeat and repeat. Dr. Byram says that if it were not there the student would search it out for himself. How is the student to know what he is searching for? Many would not know what is to be sought out. There is that inborn quality in some men that brings them very close to their fellow-men, and there are others who never could get there, no matter how hard they try.

How can we imbue into some teachers the ability to get right down alongside of a student and help him by his own personality? I did not go into methods, because if I did there would have been a volume necessary. I simply touched upon the general subject, stating there were methods galore—as many as there are teachers.

Operative Technics: How it Should be Taught.

By Dr. Daniel H. Squire, Buffalo.

The subject of operative technic is a broad one, one which develops the artistic and mechanical skill of a student to a great degree. It is the foundation of operative dentistry, and the future development of a skilful operator depends upon the instruction received in this course and upon the ability of the demonstrator to make it thorough in every detail. Too much stress cannot be laid upon the importance of being particular in regard to the little things which enter into this work. Operations should not merely be good enough, but must be as perfect as the ability of the student can make them, and it is the *duty* of the demonstrator to get the very best out of each man.

The course in operative technics need not necessarily be elaborate in order to give the student a thorough grounding in the principles of operative dentistry. We should know that the demonstrators make the students live up to the requirements. Teachers in this capacity are so apt to shirk such responsibility, that the professor of operative dentistry should make these men feel that lax methods will not be tolerated. This may be accomplished by weekly meetings of the entire operative staff, when the work of the students is shown, and any failure on the part of the men to live up to the schedule is discussed. It is also the proper time to correct any false interpretation the demonstrators may have formed of what the head of the department is teaching.

Many demonstrators feel that in order to be good friends with and held in affectionate remembrance by the students, that they must be lenient, pat them on the back, and accept a poor quality of work as *good* enough. This affection upon the part of the students for such demonstrators will not be lasting, however, when the students go out into the world to earn their living and begin to realize their deficiencies. They naturally reason thus: Why did my teacher allow me to do work so poorly, when he knew the demands which would be made upon me in practice? The fact is, that there are *few* men who are competent to demonstrate; and the time has passed when these important positions should be given to the men who will work for the least money. We all know that the teachers we remember most kindly are those who made us *do* things properly.

In order to teach operative technic thoroughly, we should have, first of all, a *head* to the department, the professor of operative dentistry; secondly, competent *gentlemen* to demonstrate, who will agree upon and teach the same methods. Nothing is more embarrassing to the student than a diversity of opinion among those engaged in teaching the same subject; and, thirdly, teachers should be impartial in all their dealings with students.

Great care should be exercised in selecting men for these positions, as the members of the infirmary staff should be composed of men who have been educated as demonstrators in the technic department.

This subject should be taught throughout the freshman year and finished by January 1st of the junior year, and the students passed to the infirmary.

Six hours a week is sufficient time to devote to the work outlined in this paper.

To the average freshman, tooth forms mean very little; therefore the manner of presenting this subject to the first year men is an important question to decide. It must be simple, so that they will become interested and grasp the ideas which it is desired to convey to them in regard to the surface formations of the teeth, the location of the pulp cavity and the methods of restoration from tooth decay.

We should strive to present any subject in the most simple manner, so that the dullest student may comprehend. The perfection of our teaching should be judged by the development of the poorer class of students. The bright men will be easily taught, but we should remember that *all* must attain a certain degree of skill before they are allowed to pass on to the next course.

At the beginning of the freshman year the men are taught to make the following instruments:

1 Hoe excavator, No. 79, S. S. W. pattern.
1 Hatchet excavator, No. 9, S. S. W. pattern.
2 Chisels, No. 12, S. S. W. pattern.
2 Corkscrew pluggers, No. 6 and 7, S. S. W. pattern
1 Explorer, No. 18, S. S. W. pattern.
1 Dozen broaches, 6 triangular, 6 round.

This amount of work seems to be sufficient to teach the men the methods of handling tools, and the principles of shaping and tempering instruments. This occupies three weeks' time.

We present the subject of dental anatomy to the freshmen students by lectures and a laboratory course of modeling, the latter supplementing the lectures. This idea is not new, but we find it a very good method. The material used for this purpose is called sculptor's clay. It comes in powdered form and it should be placed in a strong cloth sack and immersed in water about one hour before it is to be used. It is very fascinating work, and the students thoroughly enjoy it. The clay teeth dry rapidly after they are modeled, and are ready in from 48 to 72 hours for the cavity preparation. If these teeth are coated with white enamel paint, they will last a long time and can be used for demonstration in lecturing upon operative dentistry.

We model the following teeth in clay:

(*a*) Superior Central Incisor.
(*b*) " Lateral "
(*c*) " Cuspid "
(*d*) " First Bicuspid.
(*e*) " " Molar.
(*f*) " Second Molar.
(*g*) Inferior Central Incisor.
(*h*) " Cuspid.
(*i*) " First Bicuspid.
(*j*) " Second Bicuspid.
(*k*) " First Molar.
(*l*) " Second Molar.

Six weeks is occupied in the modeling course.

When the modeling is completed, lectures begin in operative dentistry, and the principles of cavity formation and retention are carefully explained. Classification of cavities is taken up first, beginning with the simple ones and ending with the more complex forms.

Each day the student carves the cavity in the clay tooth which has been described to him in the previous lecture. The student is thoroughly drilled in cavity nomenclature at this time. The instruments required for preparing the cavites in the clay teeth are small vulcanite scrapers and chisels. The students comprehend the principles of cavity formation more quickly in this way because the cavities are prepared upon a much larger scale. These teeth are restored by means of colored clay to their original forms. The difference in the preparation of cavities for porcelain inlay work is pointed out at this time, and this class of operations is limited to the six anterior teeth.

The instruments used for burnishing the matrix to the walls of the cavity are lead pencils with the rubber ends formed to do the work properly.

Impressions are taken of the cavities with matrices formed of No. 60 tin foil. These are invested in soft clay and afterwards filled with clay of the same consistency and allowed to dry. When the clay is hard the inlay is removed from the investment. The matrix is then stripped off and the filling placed in the cavity. In restoring these teeth to their former shape with colored clay, the student is also confirming his ideas of the correct forms of the teeth, and this practice will be of great benefit to him in the future in restoring broken-down teeth, the carving of porcelain body and, in fact, all kinds of contour fillings. If a mistake is made in shaping the tooth, it can be more easily remedied in clay than if the tooth were being carved in a harder material. Clay may be added at any stage of the building process, whereas if hard substances were used, this would not be possible, and a great deal of valuable time would be lost.

Cavity preparation and restoration in the colored clay occupies four weeks' time.

The superior cuspid and first bicuspid, the inferior second bicuspid and first molar should be imbedded in plaster in the same relations they would bear to each other in a normal dental arch. This is done for the purpose of studying the interproximate spaces and points of proximate contact, and when the relation which they bear to each other is pointed out, the student can readily understand how *necessary* it is in filling the teeth to restore their original contour, so that the interproximate space and the health of the gum may be preserved. This is the proper time to impress upon the student's mind the evils of " slab " fillings, how annoying they become to patients by allowing food to wedge in between the teeth, irritate the gum, and decompose there. These facts are very important, and can be demonstrated with the clay teeth to advantage.

The clay teeth can also be used in opening to the location of the pulp cavity. The pulp chamber is then hollowed out and the points at which the canals leave it are marked. In this manner the students may be taught the proper approach to the pulp cavity and also given some idea at least of what is to be found there in the natural teeth. This occupies about one week's study. The work upon the clay teeth is now finished and the student begins the carving of teeth. Celluloid is used for this purpose, and the same number of teeth are carved in this material that were modeled in the clay. In this work the natural teeth are copied as closely as possible in regard to size and form. It enables the students to apply the knowledge they have obtained in the modeling course and to farther develop their skill.

A lantern lecture illustrating enamel cleavage is given at this time, and the margins of the cavities are cut in the celluloid teeth to conform with the direction of the imaginary enamel rods. All previous cavity preparation is repeated upon the celluloid teeth and they are filled with cohesive and non-cohesive gold, tin, amalgam, gutta percha and the cements.

The lectures upon the above-mentioned filling materials precede their manipulation in the laboratory, so that the student may know about their physical properties, while he is learning to use them.

Practice in rolling non-cohesive cylinders of tin is also given, and the student instructed in the art of filling cavities with them. The carving in celluloid occupies about ten weeks, cavity preparation about two weeks, and the filling of the cavities four weeks. This finishes the work of the freshman year.

The junior work begins with what we call a practice model. The suggestions came from the Toronto college, and it is an excellent idea. It consists of a set of teeth made of either compressed celluloid or white rubber, with a representation of the alveolar process and palate vulcanized around them in soft rubber. The teeth thus being retained in an elastic body, the student is enabled to produce separation of the teeth and properly adjust all kinds of matrices.

This model is used to review the cavity preparation and methods of filling teeth as given in the freshman year, and to train the student still farther in porcelain inlay work. The impressions of the cavities for this part of the work are now taken with matrices of gold or platinum (depending upon whether a high or low fusing porcelain is used), and the fillings baked and cemented in the celluloid teeth. Each student is allowed to insert some fillings of cohesive and non-cohesive gold, so that he will have more confidence in his ability to work gold when the opportunity comes to him in the infirmary. This occupies nine weeks.

Natural teeth are utilized for demonstrating the following: (*a*) Forms of the pulp chamber and course of pulp canals; (*b*) pulp treatment.

Forms of the pulp chambers and of the pulp canals are taught by having the student mount the natural teeth on blocks of wood by means of sealing wax, with the cavities exposed. The pulp chamber is opened into and the pulp canal located. A smooth broach, made by the students in the early part of the course, is now introduced fully to the apex, and left there as a guide, so that the student will not obliterate the pulp canal in filing the root. A coarse file is used and the canal is exposed throughout its whole length. The broach is then removed and the peculiarities of the root noted. This study is farther continued by sawing each tooth into five or more sections, the crowns at the incisal and cervical third, the roots at the cervical middle and apical third. Two weeks is devoted to this work.

In the treatment of pulp canals the student imbeds the same number of natural teeth in plaster which had previously been modeled in clay. These teeth are arranged as nearly as possible in the relations they would bear to one another in the dental arch.

Pulp capping is studied first, and the students are taught when this method is permissible and how it should be done.

This is followed by the technic of applying arsenious acid to the dentine and also directly to the pulp. The danger in the careless use of this drug is pointed out to the student.

Pressure anesthesia is carefully studied and the method of applying the cocaine demonstrated.

The students now take up the treatment of putrescent pulps and this is taught according to the method employed in the infirmary. Each step in the treatment is followed, from the introduction of the antiseptic, at the first sitting, to the final filling of the roots. Then the teeth are removed from the plaster and filed to the pulp canal to show how well or how poorly the work has been done. This work is accomplished in two weeks.

Operative drills have been established with good results. The class is divided into two sections, each taking their turn as operators and patients. They are first taught to properly cleanse a set of teeth, and while doing this instructed in the general treatment of patients and infirmary deportment. The rest of this work consists of adjustment of clamps, matrices, and separators, and applications of rubber dam to all the teeth, and the use of cotton rolls and napkins. This is accomplished in one week's time, and the students are ready to enter the Infirmary.

Discussion.

Dr. E. T. Darby, Philadelphia, Pa.

I have been very much interested in this paper. I had the pleasure of reading it a day or two ago, and I read it again on the cars coming from Philadelphia to-day. The essayist has covered the subject very well indeed. There are those engaged in teaching who think all this work in the technic laboratory is a waste of time. They say we made better dentists in olden times, when we put them to work in the clinic room and kept them at it. Their argument is that the way to learn to ride horseback is to get on a horse bareback, and let him go. You hold on or you fall off. I occupy a middle ground. I believe it is possible to devote too much time to technic work, and too little time to real actual practice in the clinic room. I believe, on the other hand, it is better for the beginner if he be given some fundamental principles in the technic laboratory. And we are doing that in the University of Pennsylvania, I sometimes think, to too great an extent. I am a little jealous at times because the student spends so much time in that room. It was with great disappointment that I acceded—not consented—to going back to a three years' course, because I believe that fourth year which we so much wanted would be just what the student needed to complete his curriculum in dental practice.

I wanted to make that largely a year of dental practice, and have him do in the clinic room over and over again the things he had already learned to do indifferently. I should have had no sympathy with anything short of practical work in that fourth year, both in the mechanical laboratory and operative clinic. We do not teach operative technic exactly as Dr. Squires outlined, and yet in the main we do. We teach them modeling in clay and in carving. We go a little farther. We give them natural teeth, and ask them to prepare cavities and fill them with tin and with plastics. They make sections of teeth, fill the root canals and then they make a certain number of tin fillings after the cavities have been prepared under the supervision of the demonstrator or his assistants, and then present them as completed operations. We feel that the thing to learn on is the natural tooth. They may model a tooth never so well, and yet not learn the histology of the tooth until they work on it. The study of mankind is man, and the way to learn the structure of a tooth is to work on teeth. I want to show you some work of the freshman class of this year. I sent a note to one of the demonstrators asking him to send me a handful of the work of the freshman class from the operative technic room. He brought them to me as I was leaving this morning. That is what we teach in tin fillings. We would be glad to have them done in gold, but you will recognize that it is impracticable on account of the expense. And yet the working of tin foil is not bad practice for students. If they can make restorations of contour with tin, they can make restorations with gold. They use it in cohesive form—on occlusal surfaces in cylinder form. They learn in the technic laboratory practically all that the student would learn in the clinic room with limited experience. The theory is that when they come the following year into the clinic room, they are pretty well acquainted with the forms of teeth, the shaping of cavities and the anatomy of the teeth, the position of the canals and the filling of those canals. But strange as it may seem, there are men who come up to the clinic room after a good record in the technic laboratory, and do not know how to prepare a cavity in the mouth. Hence I say that while I do not object to the amount of work that is done in the technic laboratories, I sometimes think the best way to teach dental students to practice dentistry is to put to work on the patient at once, and tell them to sink or swim.

Dr. John I. Hart, New York

Unquestionably the students taught by the method suggested by Dr. Squires will make excellent students, but I agree with the principles enunciated a few moments ago by Professor Willmott, that we must have an ideal to live up to. Rather than place our students at carving teeth or moulding teeth, we prefer putting them on the natural teeth—extracted teeth—that have been kept moist, and working on them so as to obtain the best idea of the relation of the pulp chamber to the tooth, and of the root canal to the tooth, and the best idea of the enamel cleavage. We therefore only disagree on a sequence. They place the student at work on the natural teeth ultimately. I believe it is unnecessary to work first on clay. I believe if they work on the natural teeth placed in plaster or imbedded in wood so as to be held firmly, they get an idea of the macroscopic form of the tooth, and afterwards if they want to work at carving teeth from bone or celluloid, so much more manual dexterity do they get. First let them get their idea of tooth form from natural teeth kept moist. He says that " good enough is not enough," and I concur with him. We want something better than " good enough." Dentistry in its practice and in its education is made up of too many details for us to fall short on any of them. We meet our demonstrators once a week, and I do not think that is any too often. I heartily concur with that portion of the paper. We have the students fill the root canals and then file those teeth so they can judge how well they have been filled. We have them prepare cavities in the natural teeth and fill them with tin, as outlined by Dr. Darby, and we have the senior students fill extracted teeth with gold prior to their working for patients. We find they have a better idea of handling the cavity by working on the teeth first than having them work in the mouth of the patient. I think the difference between modeling teeth in clay and working on the natural teeth is just the difference that the professor of anatomy would find in trying to teach anatomy from the mannikin and teaching it from the cadaver. I want to bring out a discussion if I can on the importance of having the students work on the natural teeth; not but what he has achieved good results here, but I think the students lose their idea of proportion. I think they are going to expose more pulps if they are taught this way than if they are taught to prepare cavities right from the start in the natural teeth. Let them cut those teeth into all sorts of forms. Let them work on the substance they are going to work on all their lives. Keep those teeth moist and you will have them as near the natural condition as possible.

Dr. J. H. Kennerly, St. Louis, Mo.

I suppose from Dr. Hart's discussion that the middle West in which I live, and the locality in which Dr. Brannigan lives, must be somewhat similar, although widely separated. We try to teach the preservation of teeth, and we have taught it—or apparently so—to such an extent that it is almost impossible to get extracted teeth either by buying, stealing, or any other way. If they extract teeth enough in New York that Dr. Hart and Dr. Weisse can teach all of the operative technic on natural teeth, together with the natural destruction that comes to the teeth, what more can we say? I will try to give you an outline of operative technic, as taught in the West. We have some people with us to-day who are here for the first time, and being the farthest representative from the West (my friends from California laugh when I say I am from the West) I want to say that this technic association originated out there. Like every other good thing that comes from that country, when it reached here, everybody was willing to take it up. The results have been good—to such an extent that a school to-day without a course in operative technic is not considered up to the standard. The paper illustrates very nearly the course that we pursue. We formerly used the method of moulding teeth by hand out of clay. We have discontinued that for various reasons which it is not necessary to explain. We begin by getting all the extracted teeth we can, and keeping them in a solution that will keep them moist so they can be filed. The first process we go through is the filing of the tooth in every direction, so the student may be taught the anatomy and histology of the tooth, bringing out every line of enamel and dentine and also every root canal. After those sections are made and passed upon as satisfactory by the demonstrators, each man is given a lecture on his dissection. He is not only given a lecture, but also a quiz. Dr. Hart said a while ago that the best way to teach anatomy was to dissect the cadaver; but if you do not have something that leads up to an understanding of the subject, then your anatomical teaching is wasted. The man who is teaching anatomy to-day does it by the construction of the skeleton or the moulding of it in clay. Some of them even mould the muscles and put them in place. After this construction is made, the men are taken individually by the teacher and quizzed thoroughly upon the dissection, so as to find out whether they properly understand what they are doing. The thought was advanced that the men by carving the tooth and opening up the natural tooth would be much more liable to open into the pulp chamber. If a man thoroughly understands the dissection of the natural tooth, he will understand when he is in the vicinity of the pulp chamber, and will stop before he gets there. Even after they have been taught everything that you think you can teach them on this point, they go out and do that very thing sometimes. As a final step, the man is made to take extracted teeth, invest them in plaster, prepare the cavities, and insert his fillings. His technic teaching has brought him up by gradual gradations until, when he is through, he has a broader and more comprehensive knowledge of what we are trying to teach him than he would otherwise have.

Dr. A. E. Webster,
Toronto, Canada.

I wish to compliment Dr. Squires on his paper. It is an unusually good one, and it has made a strong impression on my mind in regard to the moulding of clay and the making of the cavity. No student can understand the size of the fine cavity in the natural teeth. He cannot see. You may tell him in the infirmary, but he does not understand it. With this he can see it; it is large enough for him to see. It would be even better if it were larger, like the forms of Professor Black, which he uses for demonstration. However, this is large enough to see what is being done. Another commendable feature is the use of the flexible tooth form and the carving of the forms of the teeth. It must not be understood that when the student is spending a large part of his time on anatomy, it is all for operative dentistry. Not at all. He uses this form from the first year until he graduates. A student, before he begins to carve these teeth, examines several skulls, sees the shape and form of the teeth, and proposes in his model to follow out an ideal. There are no two alike. This young man's idea (show in model) was that the teeth should be arranged this way.

He is getting an instruction in temperament. He has studied his anatomy carefully in detail and in general. What use of that may be made afterwards? He may make the preparation of the cavities as you will see here. He has several cavities prepared and the fillings inserted. Some cavities are open. There are orthodontia appliances here, crown and bridge work. Later on he will put porcelain fillings and crowns and bridges all on this form. These teeth are on a flexible base and may be separated. Matrices may be used. The tissue which they are composed of cuts almost like dentine. They are not of celluloid, but of vegetable ivory. Cut on these with your knife and see how similar it is to dentine. The only way to learn how to prepare cavities is out of the mouth. It was suggested to me by Dr. Willmott to say why I use vegetable ivory instead of celluloid. It is more easy to handle, will stand vulcanization, and it cuts better than celluloid in the carving; it never changes color. You can have a perfect color and make color selections for your crown and bridge work and porcelain fillings.

Dr. T. W. Brophy, Chicago

I would like to ask a question of the gentlemen engaged in the teaching of operative technic work. How much time in the freshman year do they devote to this teaching, and how much time do the teachers believe should be devoted in the college course to operative technical work in the first year, and if any in the second year? What constitutes a college course in operative technical work, as the teachers here give it?

Dr. H. E. Friesell, Pittsburg, Pa.

I might first answer the question Dr. Brophy has asked, as far as our institution is concerned. We give nine hours a week to the freshmen, and nine hours to the juniors, on strictly operative technic work, for the eight months. Those hours are laid out on schedule. The freshmen have three days a week, three hours each, and on the other three days the juniors have three hours each day. What might be classed under porcelain operative technic—the cavity preparation and the porcelain work—is done in the senior year. We divide the class into sections. Twelve hours a week are given. Each section gets two hours a week for the full course for all porcelain work, including cavity preparation. In the Pittsburg Dental College we start in the freshman year in operative technics. We take a central, lateral and cuspid, upper, and then go to the lower, and then the upper and lower bicuspids, and then the molars. We make two vertical sections of each, place them on the block, and fasten them with sealing wax. We also make a cross section at the gingival line. When they get through with that, they will take natural teeth, open into the cavity, expose the pulp chamber, and, inserting a broach, work it through the canal. If they cannot get it through the dry teeth, we teach them the sulphuric acid method of opening up the canal. After filling the canals they file the teeth down to see how they succeeded in the filling. They carve eight upper and eight lower teeth from celluloid blocks. We do not know anything about this vegetable ivory, and animal ivory is too expensive.

Dr. A. E. Webster, Toronto, Canada. If there are any button factories near you, you can get it.

Dr. H. E. Friesell, Pittsburg, Pa. I believe the students get a better conception of their work in carving the teeth in the natural size, and we try to have each man have a typical tooth of the class he is going to carve on the bench in front of him, and when he is through we take it away, because they are hard to get. In the junior year we start in by studying the forms of decay, its progress, and the attack of caries in the natural teeth. Each man is given a tooth showing the progress of caries according to Dr. Black, I believe, showing the various points of the attack of caries. They study the conditions, and then make a section half way through the affected area. They study the conditions of the enamel and the dentine. We give them each a set of plaster teeth enlarged about three diameters. In these they prepare cavities, following out the ideas gained in studying the progress of caries, taking in all the infected area or the threatened area. We do this for the reason that Dr. Webster has explained. It is easier to show a man the style of cavity preparation you want, the distinctive box shape or cubical cavity, the plane of the enamel walls, the making of the cavo-surface angle, because the student can do it easier and the demonstrator can see if the student is getting a correct conception of his teaching. Then he takes a natural tooth. If it has a cavity, all right; if not, he makes one. He makes two cavities of each class in the appropriate natural teeth. Considerable difficulty is encountered in the breaking of these teeth by the men who have not taken care in sharpening their instruments. After breaking three or four teeth, they see there is some wisdom in what we tell them about sharp instruments. Dr. Arthur, who was a member of our faculty, advised the use of celluloid, and devised the now well-known Typodont. There is one drawback to it; we cannot get the separation we would like. The cavities prepared in the Typodont are filled with gold. I do not keep the teeth moist; they are dry. Some lie in my laboratory for a year before the students get them. I sterilize them before I give them to the students by soaking them for about a week in a pretty strong solution of formalin. I do not have any trouble in getting extracted teeth. I have about a bushel in my laboratory that I have not had time to sort out. I have between 70,000 and 75,000. I write to the alumni of the school once or twice a year, offering to pay the expressage and postal charges if they will send me the teeth. As I or my assistants have time, we sort these teeth, and we always have enough ahead for all this work. I would like to ask again where this vegetable ivory can be obtained, and if it is expensve.

Dr. A. E. Webster,
Toronto, Canada.

We have in the Royal College of Dental Surgeons gone through the natural tooth stage, then the vulcanite stage, then the celluloid stage, and are now at the vegetable ivory stage. The ivory may be obtained from any button factory. They get it in nuts about the size of your fist. Ask them to saw it up into blocks about the size you require, large blocks for the molars and smaller for the cuspids and incisors. They cost about thirty cents for a box of fourteen. They will supply any dealer with thousands of them, and saw them up for you. It is a nut which grows in the West Indies.

Dr. H. M. Semans,
Columbus, Ohio

A thought has come to me since the reading of the paper, and that is, that in teaching operative technic we are governed by the conditions of our operative clinics. There is no uniformity at all in our operative clinics, taking the colleges collectively. Some institutions place a freshman in the operative clinic at cleaning teeth, etc., and keep the students all busy. Other institutions have to depend on technical work to give the students the proper amount of preliminary training. We have just a fair number of students, running from ninety to one hundred and forty in the three classes, and we have a large clinic. Our seniors are occupied so in the clinic that it is really a hardship to have them do anything besides attend the required lectures of the course. With the juniors this year we found it necessary for the sake of not only helping our clinic, but keeping the patients satisfied, to rush the juniors up to Thanksgiving week and place them in the operative clinics on work that would ordinarily be assigned to the third-year class. In the freshman class we give them six hours a week of technical work in sectioning and modeling teeth, and drawing outlines, etc. Our second year is devoted to six hours a week in the filling of forms, and also the making of models and placing of porcelain inlays, commencing first with large plaster models and then with the regular size teeth. Our operative clinic, especially this year, has caused some change in our arrangements, so I think it must be that way with all the institutions. There seems to be a demand for uniformity on the part of the colleges, which I do not think can be done, as our operative clinics control that entirely.

Dr. T. W. Brophy,
Chicago

There is a phase of this subject to which I have given some thought, and that is, the passing from the technical work to the practical work in the infirmary. It has been a practice with most of us in the West to give this technical work always to the freshmen, and then we are impressed with the fact that after they have completed their technical work they are not placed in contact with the patient soon enough, as a rule, to put this technical work into actual practice. I know schools in Chicago that have not done that to the extent they should. As I review the work, when a student has completed his technical work and done it satisfactorily to his teachers, there is no reason that we can figure out why he should not have a chance to put that knowledge into actual use with his patients. If a period of many months is allowed to go by, much of the knowledge he has acquired will have been forgotten, and so we should devise a plan by which these men after completing their technical work and finishing this preliminary training, should be permitted to go into the infirmary and put it into actual use after the first year. It has been our custom during the second year to keep the men busy in the laboratories in making experimental work in crowns and bridges and all that. There is an abundance for them to do. It keeps them busy and gives them a knowledge which they ought to have, and yet they are barred from making use of this technical knowledge at a time when this practical work should be given them. I think this body could solve that problem, and I would like to hear the opinions of the members, how best to put into practice this technical knowledge. In the second year, after finishing their anatomical work, after finishing their work in chemistry and bacteriology, they must complete their work in histology and their technical work in orthodontia and crown and bridge work. All that must be done and should be completed in the second year, so in the last year they will have the free use of their knowledge.

Dr. J. B. Willmott, Toronto, Canada. You want that extra year, then, don't you?

Dr. T. W. Brophy, Chicago If you will pardon this slight digression from the topic, there never has been in the history of dental education in this or any other country a course of education in years. The expression is a misnomer. It means that fractions of years are called years. It is not fair, and so when we sum up how much work a student does, it should be in days and hours. The most advanced universities of this and other countries are not speaking of years of instruction, but of hours and even minutes, and the only way to measure the course of instruction is in that way. When we sum up the courses, there is not a dental college on this continent that gives a course of instruction of over six weeks longer than a three years' course of thirty-two weeks.

Dr. A. E. Webster, Toronto, Canada. I would like to discuss something suggested by the speaker on the clinic question. Why should we work for all patients who apply at a clinic? It would seem as if we are governed, as the doctor admits, by the kind of clinic we get. While this may be true to some extent, we should avoid getting into competition with the regular practitioner. We should turn over the patients who can afford to pay some fee to other people. I think the problem of allowing the student to go immediately to the infirmary after his technical work has been solved in many colleges. I know a goodly number of them. Why not put more laboratory work into the first year and let the operative technic come into the second year? The student is allowed to go slowly into the infirmary, and he may be under the guidance of one of the seniors. I think it can be worked out if it is tried.

Dr. Louis P. Hall, Ann Arbor, Mich. We follow that plan. I wish we could give our freshman students dental anatomy, because I feel they ought to know what they are working up to as early as possible. They are confined almost entirely to prosthetic work in the first year, and in the second year we aim to give our juniors the practical prosthetic work. Our juniors are given the technic work in the first semester; the freshmen carve models of teeth and have some anatomy, but not a thorough course at that time. They do the carving for the manipulative benefit to be derived from it. In the first semester the juniors have their operative technic, and are obliged to finish that before they go into the operating room and have practical work there in the second semester. We have a set of zinc models from which they make moulds, and in that way they each have a nearly perfect shaped tooth, and of a sufficient size to work on all sides. We show the cavity preparations, and they all have their cavities alike, and the teeth are the same shape and style.

Dr. A. R. Starr, New York While we recognize the great benefit to be derived from a course in operative technics, I am sorry to say that, from pressure of overwork we are unable to give our students very much time for instruction in that department. We only give them about seven weeks of three hours a day. We start them out with instruction in the tooth form with the large models, and with those models they are taught to prepare the cavities; then they work on the natural teeth imbedded in rubber or plaster models, and introduce the various filling materials. They are also taught to make tooth sections. That seems to be similar to what is being done in the other colleges, but there is one part we do not give, which I wish we could give, and that is the modeling or carving of the teeth. I think there is no better way of teaching a student dental anatomy than that. He remembers the tooth form much better. We believe as Dr. Darby does, that the proper way to teach a man to ride horseback is to put him on the live horse. You may teach him the proper position and grip and how to rise in the saddle, etc., by putting him on the automaton, but the automaton is not liable to buck and shy and try to stand on its head, as the horse may do, and as some of our patients seem inclined to do. After the completion of the regular technic course our students take a course in clinical demonstrations, and then they are allowed to go into the infirmary. They are first instructed in the proper mode of cleaning teeth. Immediately after the freshman year they can take the infirmary course if they desire, and can begin the second year infirmary work immediately, under proper instruction. They begin with plastic fillings, and then they can be taught to fill with gold if they wish. Our infirmary never closes, except on Sundays and holidays. It is open summer and winter, and we always have instructors on hand during infirmary hours to teach the students.

Dr. J. Q. Byram, Indianapolis

I should like to reply to Dr. Darby and Dr. Starr. I believe their experience is largely from the platform. I would like to ask these gentlemen how many hours they spend in the infirmary as instructors? According to my way of thinking, they are wrong. I believe that the lectures should precede the operation, and the operation should immediately follow. Dr. Starr may lecture on a simple approximal cavity, but how many of the students in the infirmary can follow him by preparing such a cavity immediately after lecture? Probably ten per cent. By the time the others get a cavity of that class they have forgotten the instruction. If they had prepared the cavity and filled it immediately after they received a lecture on that class of cavities, they would have remembered the fundamental principles of its preparation much better. I also think the technic should precede the practical work in all cases.

Dr. E. Hillyer, New York

It might hold good if you had a small body of students to handle; but with a large body such as we have, I think it would be utterly impossible to carry that on and carry on the other sections as well.

Dr. J. Q. Byram, Indianapolis

Divide the class.

Dr. E. Hillyer, New York

That is all right.

Dr. J. Q. Byram, Indianapolis

But do you mean to say from the platform Dr. Starr divides his classes into small sections and then lectures?

Dr. E. Hillyer, New York

Not at all; but this ten per cent. of students may be able to go into the laboratory and work on that while the other ninety per cent. are at work in other departments on other things, and how can they follow it? It is well enough to say that they can follow it in sequence; but to take it up immediately after would be impossible with a large number of students.

Dr. J. Q. Byram, Indianapolis

I teach seventy in one class. I can lecture on a subject and have the class follow the lecture, by all doing the same work at one time. You may have to divide your classes in two or three sections. There is not a class in the country that has more than two hundred and fifty, and with two or three demonstrators you may follow this method. I should like to repeat a statement I made in Chicago several years ago, that is, that the individuality of the technic teacher is lost in too many cases. I believe we should give him more latitude, and let him work up his course. One of the greatest mistakes is that the colleges divide their technic work up and have too many assistants. One teaches dental anatomy, another cavity preparation, another crown and bridge work, and another plate work. You cannot divide the course in that way and give it as I suggested, but if you have one or two teachers taking entire charge of this work, by the aid of their assistants they can do it and do it well.

Dr. H. M. Semans, Columbus, Ohio

Along the line Dr. Byram was speaking on, we have made that practice, to unite our technical demonstrator and the superintendent of the operative clinic. Our technical demonstrator carries the junior class right through, and he knows each individual's ability. If our clinic demanded it, he could place the juniors that he knew would be able to do the work in the clinic.

Dr. Geo. W. Warren, Philadelphia, Pa.

I have no desire to enter this discussion, as I did not have the pleasure of hearing the paper, but wish to offer just a word concerning the placing of freshman students at the chair in the clinics, as suggested by a previous speaker. In the school with which I am associated we never think of doing this. Our freshman students are placed at operative work in the class room upon teeth out of the mouth, the typodont, and upon each other. We have our instructor in operative technic take them in small sections, starting them first cleaning each other's teeth. There is no better schooling for a student than to have a fellow-student work in his mouth; he will then appreciate what a heavy hand and clumsy manipulation means. We instruct them as to how to handle a patient, how to have them take the chair, how to adjust the dam, etc. Our boys are put through a thorough drill in the adjustment of the rubber dam upon each other as a part of their class instruction. Then they take up the preparation of cavities and the mixing and manipulation of plastics, so that when they come to work in plastics in the clinics they do not cause unnecessary pain, nor waste time or material. At the beginning of the junior year this is reviewed, after which they take up more advanced work in the class room. This system overcomes the disagreeable and unjustifiable method of giving students their preliminary instruction over the patient. We want him when he comes to the chair to show he has some knowledge of the operation, what instruments to select and the purpose of each instrument, how to handle his patient, something of cavity preparation, the manipulation of plastics, etc.

Dr. W. G. Foster, Baltimore

We do not allow the freshman to do any work in the infirmary. He can come in and look at any of the operations, but he is not permitted to perform any himself.

I had an instance in the infirmary of a patient who had been assigned to a senior man. The senior went away for the Christmas holidays and turned the patient over to a junior without reporting it to me. The next day I received a telephone message from the patient, asking if so-and-so was a competent man and could perform the operation. The patient thought he did not understand exactly what he was to do. It led her to suspect that he knew very little of this operation, and as she considered her teeth a very important matter, she preferred to have someone else take charge of it. If you permitted such practice as just mentioned to take place, you are driving the patient away from the infirmary. That is not our object. While this class of patient are often store girls and men who cannot pay any large amount, they are willing to pay something, and they think it better to come to a school where they are carefully looked after than get into some cheap man's hands. Many patients appreciate the work done for them. We do not permit a freshman to have anything to do with infirmary work. The first work the student does in the infirmary is in the junior year. The freshman is permitted to come in the extracting room under a competent man, but is not permitted to handle any patients in the infirmary.

Dr. H. E. Friesell, Pittsburg, Pa.

I would like to add something I forgot to say last night, that is, in our institution we give what you might term an examination in technic work. This is given about the middle of the senior year. I then have the demonstrator who instructed the present senior class, when they were juniors, take the men one or two at a time and have each one demonstrate before him that he is still able to carry out the instruction he received during the second year. This is done irrespective of the instruction they receive from the demonstrators in the infirmary. The chief of the technic department sees each of these students, and sits at a table with them in a private room, staying with them until they perform each operation properly, from the sharpening of instruments right up to the applying of force in the condensing of gold. He goes through each stage. Some get through very rapidly, and others have to go back and take a little extra work in technic. Sometimes the men at the end of the junior year will be able to do very nicely in technic work, and yet when you put them in the infirmary, and they look into the patient's mouth, they forget everything you taught them, particularly if they have been with a preceptor, and he has permitted them to operate a little. They do as they have seen him do, and forget what you told them in the class.

Dr. D. H. Squire, Buffalo, N.Y.

In reply to Dr. Darby, I would say that I believe a student should be thoroughly grounded in operative dentistry before he is allowed to work upon a patient. A student without sufficient education along these lines is not competent to do the work properly, and furthermore cannot comprehend the instruction of the demonstrator. I also think we should protect our clinic as far as possible. I wish to correct Dr. Hart's impression relative to the study of dental anatomy. The lecturer upon this subject explains the morphology of a certain tooth to a student, who takes a similar one to the laboratory and reproduces it in clay. His attention is always directed to the natural tooth, and by making one in clay with his hands I believe it fixes the anatomical points more firmly in his mind. Dr. Webster has spoken of ivory teeth. We have used ivory, bone, natural teeth and celluloid, and we find that the latter answer our requirements best. Six hours a week is enough time to devote to this course, if the students are urged to improve every moment. A great deal more work may be accomplished when attendance upon laboratory courses is taken and a weekly report of the poor students is given to the professor of operative dentistry. When a student enters the infirmary he is expected to go to work in an intelligent manner, but at the end of a two weeks' trial, if found incompetent, he is returned to the technic department to review his previous work.

Applied Anatomy of the Face and Oral Surgery: How They Should be Taught.

By Matthew H. Cryer, M.D., D.D.S., Philadelphia, Pa.

I wish to preface this subject with a quotation from a former paper on " The Practical Teaching of Anatomy in Dental Schools ":

" Let it be borne in mind, as a general proposition, that there is something more in teaching than merely standing before a class and lecturing upon a given subject. It must be presented in such a manner that the student shall grasp it—shall make his own the information which the teacher imparts. Instruction embraces reception by the student as well as presentation by the teacher; this dual quality is the object and essence of teaching in the correct sense of the term. Any method which does not have that result—the instilling and installing in the mind of the student a clear, definite knowledge of the subject—is a failure."

In order to obtain the desired end it has been found that the subject must be presented in an attractive and interesting manner. The practical side of anatomy must be taught in order that the student of dentistry and oral surgery may have an interest in lectures and demonstrations, without which it is useless to endeavor to teach. The following plan has been adopted in teaching applied anatomy of the face and oral surgery to those who come under my instruction:

It is presumed that the student has a knowledge of general anatomy, general physiology, and general pathology before he takes up the study of applied anatomy, which is so essential to oral surgery.

Experience teaches that better results are obtained by using several methods of presenting the same subject. Thus various avenues are opened to the sensorium, and instructions which fail to reach their destination by one route still have the probability of reaching it by some other. One of the best ways to accomplish satisfactory results is to have good photographic slides of specimens thrown upon the screen with a projecting lantern. It is found that students take more interest in the lecture when pictures of the specimens are placed upon the screen than when the specimen is held in the hand or placed upon the table. In the former case all can see the picture with its enlargement of details, so that the knowledge is conveyed to the brain by two avenues, sight and hearing, and to the entire class simultaneously.

When possible all the specimens shown by the slides, which are alluded to in the lecture, either directly or indirectly, should be arranged in groups, according to the lecture given, in such a manner that each student can go over them individually, or if necessary under the supervision of an assistant teacher.

The various groups can have similar specimens added which vary in shape, size, anatomical and pathological conditions. For example, a group of skulls should consist of one or more typical skulls, together with others varying in shape and character. By comparing these the student will readily see the great variations in the subject. A group of sections showing the internal anatomy of the face, where the various shapes and sizes of the nasal chamber, maxillary, frontal, and sphenoidal sinuses, the ethmoidal cells, and other structures could also be examined and compared. The various anatomical structures will demonstrate that there are not only great variations in the skulls, but that there are great differences in the two sides of the same skull. Groups of pathological conditions should be placed together for examination; for example, impacted teeth, showing the various positions they are liable to assume, ankylosis of the temporomandibular articulation, fractures of the facial bones, necrosis, results of alveolar abscesses, etc.

Another method which is appreciated by the student, and which is found to be quite beneficial, is to have the various slides used in lectures and additional ones relating to those grouped together and placed in illuminated frames. An example can be found in the exhibit room.

This arrangement of slides is also very convenient for the teachers of both anatomy and oral surgery. A lecturer can select his slides from the frame in the order in which they are to be used, if they be properly numbered.

It is the belief of the writer that one of the best methods of teaching is by comparison, establishing first the ideal or typical form of any structure, be it that of a single cell or the combination of many cells which are embodied in the formation of larger anatomical features.

A thorough knowledge of human anatomy cannot be obtained without considerable knowledge of comparative anatomy.

A corollary to this dictum is that a thorough knowledge of the applied anatomy of the face cannot be obtained without a considerable understanding of the comparative anatomy of this region. Unfortunately the time allowed for these studies is limited and the comparative anatomy of this region has to be slighted; but the comparative anatomy of the human skulls should be studied and taught with close attention.

As the bones of the face and head form the foundation of all the other structures of this region, it is deemed best to first study typical skulls with all their outlines and then compare them with atypical ones. The student at once sees that the anatomy of the skulls examined is not the anatomy taught in the general text-book or even according to the usual teaching of the dissecting room. Then by the comparison of varied forms of structures which are not typical one becomes well acquainted with the variations of that particular region and better prepared for the surgical work he will be called upon to do.

Pathological conditions should also be taught in this way. Establish again the typical pathological structure, commencing with the pathological cell, then passing to the general shape and character of the entire formation. This subject is usually taught by the general pathologist, but the student of oral surgery should be taken on to the treatment of all diseases which may attack the oral region. This, of course, can be accomplished best by clinical demonstrations, having as great a variety of patients at the various clinics as possible, so that the cases of tumors, obscure abscesses, impacted teeth, with all involving complications, etc., could be carefully watched and noted by the students and the various symptoms of each disease compared.

As an example, two patients are brought before the same clinic, one suffering with facial paralysis, the other with facial neuralgia. The entire class can here observe the different effects in each person and compare the lack of action of the muscles of the face, facial paralysis which is controlled by the seventh nerve, with the over-action of the fifth involved in facial neuralgia; and also study and compare the symptoms, etiology, etc. The class, seeing these two diseased conditions of the same region together, so different in their symptoms, gain a clearer idea than can be obtained in any other way.

As an illustration of the manner in which slides are employed on the screen, a partial group has been selected from these which would be used in teaching the normal and abnormal positions of the teeth and the diagnosis of impacted teeth with a view to their liberation or extraction. The first slide is an almost typical or ideal skull of the Caucasian race—in which we are most interested—showing a beautiful arrangement of the teeth both as to position and occlusion. The general outline of the skull and nearly all the bones is shown. No. 2 is from a skull of a different type, that of a negro (American born), showing great prognathism. Even with this prognathism the teeth are in good occlusion. This picture also shows a rudimentary fourth molar in position.

Having fully described these with several other skulls, the internal structures of the jaws are taken up, showing the typical arrangement of the cancellated tissue, the relative position of the roots to each other, the lower teeth with the inferior dental nerves and vessels, and the relations of the upper teeth to each other and with the nasal chamber and the maxillary sinus, all of which are comparatively well shown in Nos. 3 and 4. Other slides would also be shown demonstrating abnormal conditions of the cancellated tissue and the relation of the roots to the various structures. No. 5 gives a good illustration of the manner in which the cancellated tissue may become changed from an open lattice-work to a consolidated mass through inflammatory conditions in the jaw induced in the present case by an infected tooth on the right side. The left side would require no surgical treatment, barring accident, while on the right side it is possible to have great disturbances, and as the bone is so dense the surgical operation would be more difficult.

In lecturing upon impacted teeth, the cause of the abnormal position is dwelt upon to a considerable extent in order that such conditions may be guarded against in patients coming under the care of the dentist in the early years of life.

The positions and the cause of the most common form of impaction are taken up and the slides next following are shown with instruction that each student examine the specimens from which they have been made, which will be found in the working museum. The position of the deciduous teeth and the germs of their permanent successors in the skull of a child of about six years old are taught by specimens especially prepared for the purpose. They are fairly well shown in slide No. 6, which gives a general idea as to why certain teeth are more liable to become impacted than others, and supplies a key to the position in which they may be found.

No. 7 is an illustration of two impacted lower third molars in a rather common position. The bone covering the roots has been removed in order to give a better idea of their position. It is demonstrated to the students by operations that teeth in this position are comparatively easy to extract by the use of an elevator.

No. 8 gives a partial view of two impacted lower third molars.

No. 9 is from half of a stereoscopic X-ray picture of specimen No. 8. A stereoscopic view demonstrates the position of the roots of the teeth especially. It also teaches to the student that if the occlusal surface of the impacted tooth lies flat against the posterior surface of the second molar, as shown in the upper picture, the roots usually extend backward and more than likely pass above the inferior dental nerve and vessels; while if the grinding surface is deep down in the tissue, with the anterior cusp only locked against the posterior surface of the second molar, as shown in the lower picture, the roots more than likely pass down below the canal of the nerves and vessels, and that great care will be necessary to avoid wounding them in its removal. In a lecture other features of the bone and of the roots would also be discussed.

The next following slide, No. 10, would be shown to demonstrate to the student how an impacted lower third molar can produce resorption of the roots of a second molar until the root-canal was exposed, causing the devitalization of the tooth. An explanation should be given as to how the same impacted tooth might cause neuralgia by its root-ends coming in close juxtaposition with the inferior dental nerve. Attention would be called to the generally changed condition of the cancellated tissue of the body of the bone, which is of usual occurrence under such conditions. The student would be advised, under the condition of an impaction of this character, to extract the second molar first, and if the third molar could be removed without risk to the surrounding tissue, to remove it also. If the third molar were allowed to remain after the extraction of the second, there would be considerable resorption of the surrounding alveolar process, which would liberate the impacted tooth and allow it to move forward and upward, consequently the root-ends would not interfere with the inferior dental nerve.

To impress upon the minds of the dental students that pathological conditions of the teeth and the surrounding tissues may and do cause serious consequences not only in the region of the tooth, but in parts more remote, especially in the regions that are supplied by the same system of nerves, blood-vessels and lymphatics, practical cases are brought before the class in order that they may be diagnosed and studied. One of the methods used in making a diagnosis is that of exclusion. The teeth are first thoroughly examined to see if they are in good condition, and if so are excluded. When there are any missing and satisfactory evidence is obtained of their having been extracted, this factor can also be excluded, but all other missing teeth should be searched for. The students, having been instructed in regard to the positions of impacted teeth by carefully examining many specimens of this character, are better prepared to locate the position in the living subject. Several methods are taught the students to help them in their diagnosis, the principal ones being the use of a properly shaped excavator and the X-ray.

An obtuse-angled sharp excavator, used as a probe, is passed through the gum tissue into the suspected region of the tooth; when it comes in contact with a tooth it is easily recognized.

X-ray pictures are made which will cover as much of the region as possible. This not only indicates the tooth if present, but shows the condition of the surrounding tissue—whether it is necrosed, consolidated, or in an inflammatory condition.

The two practical cases described below are good illustrations for use in teaching these facts.

Case No. 1 is that of a man 66 years old, who had considerable trouble in the right ear, with a constant discharge of pus from the upper and central portion of the right body of the mandible. Through an exploration with an excavator an impacted tooth was diagnosed. In such cases the students are instructed to have an X-ray picture taken (slide No. 11) showing as much of the jaw as possible. With this and other information gained through knowledge of the difference between normal and pathological conditions of the jaw, a good diagnosis should be made on which to base proper procedures for the removal of the offending body.

Case No. 2. The patient, a young lady about twenty-five years of age, had been suffering for about a year with general weakness, severe pains in and about the face, head, neck; had double optic neuritis, more especially in the right eye. She also suffered considerably from dizziness and fainting spells. The patient, who had been under the care of the most competent physicians, and was surrounded with every comfort, was referred to me in the latter part of March, 1905, at the suggestion of Dr. D. N. McQuillen. An impacted tooth was looked for, under the thought that this might have been the original cause of the trouble, and that it was at this time involved in the neuralgic condition. Exploration was made with an ordinary dental excavator, which revealed impaction of the lower right third molar. An X-ray picture, taken on April 2nd(?), shown in slide No. 12, gives a fair idea of the tooth and the surrounding tissues. The students had their attention drawn to the area of bone near the roots of the teeth that had become dense. This became very important in after treatment which became necessary.

It would have been impossible to have extracted the third molar without removing the second, but the students have been instructed that under the general conditions of the patient it would be better to sacrifice what appeared to be a sound and useful tooth than to make a long and tedious operation with considerable loss of blood. After the patient was properly prepared for the operation in the hospital the second molar was extracted, after which the third was comparatively easy to take away. In such cases the students are instructed to pack the tooth sockets with sterilized gauze in order to prevent unnecessary bleeding and to protect the wound from infection. On the following day the mouth was thoroughly washed with an antiseptic fluid to remove all the infectious matter possible, after which the packing was removed and the wound washed. The cavities were then packed with cotton partly saturated with campho-phenique. (Cotton makes a better dressing than gauze at this stage, as granulating tissue does not become entangled in it as it does in gauze.) Apparently the patient improved for three weeks, when certain disturbances returned. Another X-ray picture was taken (slide No. 13), which showed particles of dense bone situated near the inferior dental nerve. A consultation was held by several specialists, and the patient was pronounced to be suffering from a tumor of the brain. Nevertheless it was decided to make another operation, but to have it as slight as possible. The operation consisted in the removal of all the bone covering the inferior dental nerve for about one and one-half inches. The neuralgic and other disturbances disappeared, and at this time, December, she has gained forty pounds and appears to be much improved in every respect.

Members of the dental profession generally lay so little stress upon the importance of anatomy and oral surgery that students become more or less affected by this influence, and are apt to look upon such branches as unimportant or even unnecessary. Consequently they become neglectful and seldom study the subject up until near the end of the session, when they will "brush up," take quizzes, "cram," if you please, in order that they may pass examinations and then forget all about it. I believe this to be an undeniable fact, and it should be met squarely by those who teach these branches. If they are of so little importance to the dentist, and are soon to be forgotten by the student, they should be stricken from the curriculum. Then the student could devote his time to what appears to be of more importance to the practitioner of dentistry. But so long as they remain in the curriculum of all the schools demanded by our State Board of Examiners, and—what is of even greater importance than the school or State Board—by all those who wish to lift dentistry to a higher plane than that of a mechanical art, it behooves the teacher to so fix the matter of these two branches in the mind of the student that he cannot forget it. Only so can his knowledge become so much a part of him that it will form an important factor in this general knowledge for the treatment of teeth, jaws, and surrounding tissues.

As a means to this end, the writer would suggest that at least three written intermediate examinations be instituted during each session, their combined averages to be taken into consideration in the final examinations. This plan would be advantageous to the teacher, as well as to the student, as it would give the former the opportunity to know whether the student thoroughly understands what he is studying as he passes from one subject to another. If the majority of the papers returned are good, the teacher will know that he is presenting the subject to his class in an intelligible manner; but if the majority of the papers returned are poor, there is evidently something wrong with the manner in which the subject is presented, and the opportunity is offered to correct the method of teaching. It also enables the teacher to detect those who are deficient, so that steps can be taken to remedy the difficulty, and they be spared the loss of a link which would mean to them a weakening of the whole chain of their equipment.

Discussion.

Dr. T. W. Brophy, Chicago

I have only to express my admiration for the work that has been done by Dr. Cryer in preparing these anatomical specimens that he has exhibited to us. On previous occasions I have stated that we are especially fortunate in America in having a man who is capable of doing the remarkable work that we have had the pleasure of witnessing to-night. I really do not know what I would do were it not for the scientific researches of Dr. Cryer along these lines. It has been a matter of great satisfaction to me personally, in performing the work that it has been my duty to do in the management of certain cases of facial neuralgia and other abnormal conditions about the face and jaws, due to the displacements and lack of eruption of those forms of teeth that have been shown to-night. If Dr. Cryer had never done anything else in his life to distinguish him above others in his professional career, this work would have been quite enough. It seems to me a little strange that men have been going along through centuries without having a knowledge of the cause of the suffering from trigeminal neuralgia. I do not think I go too far when I say that people are suffering everywhere from neuralgia due to the pressure made upon the trunks of the nerves by malposed teeth, in positions such as we have seen to-night; and the suffering is prolonged by reason of the failure or inability of the attendants to make a correct diagnosis. We have now means at our command by which a diagnosis may be thoroughly made, and we may inform ourselves in a way that there will be left no doubt as to the exciting cause of these disturbances. Prior to the advent of the Roentgen ray we groped in the dark about these conditions. It was necessary to make exploratory operations, but now, in the advance of science, and with the perfection of such work as we have seen this evening, we may determine beyond the possibility of doubt the cause of these disturbances, and then we are able to proceed in an intelligent way to remove them. It seems to me our Association is capable of doing a great deal through the work of Dr. Cryer in removing this embarrassment that has confronted medical men along through the ages, in clearing up matters that have hitherto been extremely obscure, in other words, enabling them to make a correct diagnosis of the eye, of the ear, of the face, in facial neuralgia and other disturbances. There was one question that I wanted to ask Dr. Cryer. He mentioned in the exhibition of one of the pictures that that was a tooth surrounded by an area of inflammation, which is shown in the X-ray by a darkened field. I was about to interrupt him and ask him if he felt that that tooth was the exciting cause of the ankylosis which subsequently occurred. When he closes this debate, I hope he will answer this question, Was this area of inflammation, as indicated by the discoloration, the beginning of the inflammatory process which resulted in the tempero-maxillary arthritis which caused the ankylosis? It would be impossible for me to review the whole field. I will only say I am delighted to have seen these pictures this evening. I have had an opportunity on previous occasions to see the work of Dr. Cryer along the line of anatomy and the special work he has done in outlining the maxillary and accessory sinuses, and their diseases, and their anomalies in formation; but many of the pictures shown to-night I have never seen before. It is well worth a trip of a thousand miles to spend a half or three-quarters of an hour, such as we have had this evening. I want to thank Dr. Cryer for the pleasure and profit he has given me. I hope he will bring to us at our next meeting more pictures, that all may profit thereby.

Dr. J. Bethune Stein
New York

These pictures of Dr. Cryer, in my opinion, not only from a morphological point of view, but a point of view from which we can teach histology and afterwards pathology, are very important. The students have no idea of the morphology of the tooth. They cut it and see it under the microscope, but have no idea of the alveolar process, and no idea of the nourishment of the tooth or of the peridental membrane as it really exists. Those pictures are really a starting point for the student to work from. We find the pictures of Dr. Cryer are identical with the lower power or flatter lenses we use in showing the artery and the inferior dental nerve which amounts to very little; but there is one point wherein I disagree with Dr. Cryer, and that is what we are in the habit of calling the inferior dental nerve is something more. In that tissue we have fat, we have medullary substance, blood vessels, etc., besides the nerve. If we dissect down we pull the whole structure down, and we think we have the nerve. I was surprised to find it was not the inferior dental nerve. I took the jaw of an ox and cut down on it, and found this same substance was the nerve, was the artery, was the fat, was the vein. From this pressure upon the nerve not only the neuralgia seems to be induced, but in all probability vascular changes which may lead up to ankylosis and many other changes in the jaw. These specimens are the most important of all. What we have seen to-night is well supplemented by the X-ray. It is the starting point for a dentist, and is of more importance than all the other anatomy and all the other histology. I have a few specimens; I have some jaws of oxen and some human jaws. These things are of course wonderful in their pathological as well as their morphological aspect.

Dr. R. T. Oliver,
West Point, N.Y.

I do not want the opportunity to pass without personally thanking Dr. Cryer for this splendid exhibition and interesting lecture. These pictures have brought many things to our better comprehension in a beautiful and forceful manner. I am particularly glad to hear him explain a most logical operation, this evening, one that probably may meet the adverse criticism of some oral surgeons, and that is, the free extraction of the second molar for the liberation of an impacted third molar. Most authorities claim that under such conditions it would be the proper procedure to operate for the relief of the third molar by removing freely the overlaying bone after incision and separation of the soft tissues and gouge out the tooth, leaving the second molar intact. From the possible standpoint of ultra conservative dentistry this is well and good, but when we understand the anatomical relations, so beautifully shown this evening, we can readily see what folly it would be in the majority of cases where you have a true impaction to attempt such a serious operation when the results can be accomplished just as well by the simple dental operation of extracting a tooth. I am sure some of the men of lesser fame in oral surgery will now feel that all of their efforts have not been in vain. It has been conclusively demonstrated this evening that the radiograph as a diagnostic factor in oral surgery has come to stay. The line of demarcation between the specialty of oral surgery and dentistry has been made very apparent this evening, and it promotes a thought of how many years it will be before such a thing as a general practitioner of dentistry in this country will be a relic of the past. We are rapidly coming to the division of dentistry into specialties, when we shall have operating dentists, prosthetic dentists, orthodontists, oral surgeons, etc., and I believe that one of the most important specialties will be that of oral surgery. There has not been enough stress laid on instruction in oral surgery in our institutions. It should be taught thoroughly by lectures, quizzes, demonstrations and the radiograph, in order that all students may obtain a good fundamental knowledge of the subject, and that those students with special aptitude or talent, may be able to develop it after entering upon their life's great work. I hope this Association, which largely controls the teaching of colleges of the country, may take considation of this suggestion. We have only a few oral surgeons—can almost count them on one hand—and we are specially fortunate this evening in having two of the most renowned ones with us.

Dr. T. W. Brophy, Chicago, Ill. Mr. President, we have with us this evening two eminent members of the profession from Ontario, Dr. Abbott and Dr. Pearson, of the Examining Board of that country. I would ask you to call upon them for some remarks.

Dr. H. R. Abbott, London, Canada I can only express my great pleasure at being here as a student and a listener. In Canada the college is controlled by the profession. They elect representatives from the different districts, and they form a board who appoint their professors. We merely attend to the business end of the college, and our duty and our pleasure in being here is to learn the different methods of teaching so we can direct our college and suggest to our professors that they should teach along those lines. When I graduated, we did not have any of the facilities or advantages that the students to-day have. It has been my pleasure in the last few weeks to visit some of the colleges in Chicago. I want to thank Dr. Brophy for the many courtesies he showed us while there. They treated us right royally. We were there two or three days, and they dined us and wined us and would not even allow us to spend five cents for carfare. We did not want to leave there, but we felt we had to come to New York to attend this meeting. I thank you, Mr. President, and Dr. Brophy, for the pleasure of being here, and if any of you ever come to Canada we will try to reciprocate.

The President

We have with us another friend from Canada, who is dean of the only college I believe in this country conducted in the French language, Dr. Dubeau, of Montreal.

Dr. E. Dubeau, Montreal, Canada

I am very much pleased and honored to be called upon to address your meeting. I do not know what remarks I can add. I have known Dr. Cryer's work for a few years, and always admired it, and I enjoyed very much the lecture to-night. I represent here the Laval Dental School from Montreal, the only French school existing in America. It is intended to educate French people; we are a million and a half French-speaking people in Canada, and it was necessary to create such a school. I came here to try to learn something of your teaching, and I am sure I will derive great benefits for our school from what I have heard so far, and what I will hear to-morrow and the next day. I am sorry I cannot explain myself better in the English language. We expect that at the next meeting of the National Association of Dental Faculties our school will become a member, and then we will make application to become a member of your Institute.

Dr. M. H. Cryer, Philadelphia, Pa.

Dr. Brophy spoke of the darkened area around one of the impacted teeth. That is accounted for by the hemoglobin in the blood, the latter being in excess on account of the inflammation, also because of a certain amount of infiltration within the tissue. In that particular case there was what may be called acute false ankylosis or trismus, and it is possible if this condition continued for a considerable time, the exudate would organize and a chronic false ankylosis would take place. Impacted teeth, as a rule, should be removed as soon as it is found that they cannot be liberated or assisted into a useful position. It is sometimes difficult to remove impacted lower third molars if they are allowed to remain until an inflammatory condition takes place, because of the false ankylosis or trismus which generally accompanies this condition. In speaking of extraction of impacted teeth, which usually requires considerable time, I would like to explain that when writing or lecturing for students I am inclined to lay great stress on the advisability of extracting only the third molar, with very occasional exceptions, but to-night I am speaking to the intellingent part of the dental profession of the United States and Canada and feel that there is no danger of being misunderstood when I emphasize the necessity of sometimes extracting the second molar in order to easily remove the third. For instance in the case of the lady mentioned before, who had a very weak heart, respiration impaired, and generally low condition, when she was placed under the anesthetic, with one assistant watching the respiration, another the pulse, and a third the blood pressure, it was most important that the operation be done as quickly as possible in order to get the patient out of the anesthesia. In cases like this it would be most absurd to try to save a second molar, as it might mean a half hour longer in operating and greater damage to the surrounding bone.

The Teaching of Crown and Bridge Work; A Point of View.

By Dr. Geo. W. Warren, Philadelphia.

The principles of crown and bridge work are now so well recognized that the well-equipped dentist has no excuse for ignorance regarding them, and the operator who is not well informed in this special work should not attempt its practice. The teacher of this important specialty assumes great responsibility, and should therefore be unbiased and broad-minded, leaning to neither one extreme of practice nor to the other. He will see that his pupil is well grounded in the basic principles of the work in hand before he is advanced to the actual operation, and he should couple with this preliminary training, instruction in the intelligent use and application of the instruments and appliances required. How painful it is to witness the attempt of a student to perform so delicate an operation as the preparation of a tooth or root for the reception of an artificial crown, without having first acquired a fair degree of skill in the use of his instruments. To my mind, one of the first and most important features in our class-room instruction is thorough drill in the choice of instruments and their proper manipulation. But, above all, the whole method of teaching should be carefully systematized so as to approximate the ideal operation under the conditions present in the mouth, and systematized from the standpoint of a clinician rather than the theorist.

It is not necessary for us, as a body of teachers, to enter at this time into the technic of the operation in detail, but rather to discuss our methods of presenting the subject to our pupils. I should classify the methods of teaching crown and bridge work as follows:

1. The formal lecture.
2. Technic or class-room instruction.
3. Practical or clinical experience.

The lecture system is, without question, a necessary part of professional teaching. Here the reasons for and the philosophy of the several methods of practice are brought formally before the class as a body, carrying them, step by step, through the theory and practice of the several phases of their work. In the lecture-room we get away from the purely technic side of our profession and appeal more to the mental equipment of the student. It lifts us out of the commonplace, instils in the student professional ideas, and altogether is a most important factor in dental education. So much here depends upon the teacher's personality or individuality. He should not be a dictator or taskmaster, delighting in having the pupils fear him, but an adviser and friend, a guide pointing out the way. Neither is it an important qualification for teaching that one should be a lecture-room orator, but that he should be able to impart knowledge and show the student how to apply it. He should not go over the heads of his class with technical terms and ponderous language, but should meet the minds of his auditors with the simplest forms of expression. In no department is this more truly the case than in the teaching of crown and bridge work.

It does not appear that there can be any one fixed method of crowning any and all roots presented, there being many and varying factors entering into the problem of their conservation and preparation. The lecturer therefore presents and illustrates by the use of drawings and large models, the several systems of restoration, their relative values, the conditions under which they are applicable, and the conditions which do *not* justify the operation of crowning. He also presents conditions indicating and contraindicating pulp devitalization either for simple crowns or for teeth or roots to be used as bridge abutments. There are various opinions concerning this point. One writer states that there should be a unanimous insistence on devitalization of dental pulps as necessary to ultimate success, and adds that the advantages of devitalization in bridge work—the better paralleling and technic, absence of sensitiveness, pulpitis, etc.—are too obvious to more than mention. I take it that this writer belongs to the school of operators who in other operative procedures stand ready to destroy the vitality of the tooth pulp upon the slightest provocation, on the same ground that some believe that the only good Indian is a dead Indian. Another well-known writer says he has long advocated and believed that it is seldom possible to subject an ordinary tooth with a vital pulp to the proper preparation without first devitalizing. Quite to the contrary, I am thoroughly convinced that the best tooth is the vital tooth, whether it is to be filled or is to support a shell crown or act as an abutment for a bridge. That is to say, the conservation of tooth structure and vitality is a most desirable procedure, and should be taught and practiced wherever the possibilities are at all favorable. This is simply one of the phases of crown and bridge work brought before the class calling for the exercise of discriminating judgment; all of which gives the student ample opportunity to become familiar with the theory of his subject before being taught by practical work and demonstration.

In the class-room the student receives his technic instruction, and it is needless to refer to the great importance of having this instruction conducted along correct lines and in conformity with that already received in the lecture-room. In that school with which I have the honor of being associated, the first and second-year students are made familiar with the nature and management of metals and with general metallurgical processes and with the composition and properties of dental porcelain. Their general laboratory instruction prepares them to approach during their junior year the more delicate manipulations connected with the construction of the usual forms of crowns.

When the juniors reach this work, the class is divided into sections of possibly fifteen students. A selected model is furnished offering conditions for the adjustment of artificial crowns. The instructor maps out the work, indicating what form of crown shall be made in each instance. From this model a hollow metal working-die is made, which is afterwards filled with plaster of Paris (specimen shown). Being hollow, it gives the student an opportunity to cut an opening at indicated points and insert therein either natural or metallic roots upon which crowns are to be placed.

The real technic work then begins. The student is instructed that the purpose of all crowns is, first, to restore function; he is also taught just what that implies in the way of contour, occlusion, points of contact, etc.; and, second, to restore appearance. He is then informed that in the operation itself the first consideration is the proper shaping of the root for the reception and support of the crown. The operation is gone over in detail by the instructor, who uses large models and drawings for illustration. Then follows the shaping of the face of the root and the carrying of the anterior root-edge below the gum margin, and the reasons for doing so; then, the removel of enamel from the neck of the root, and the shaping of its sides for the reception of the band or collar. The method of using the enamel cleavers, diamond discs, etc., is here dwelt upon, the section being put through a thorough drill in their manipulation to aid in developing manual dexterity. The instructor then prepares a root, dwelling upon the points already gone over, as an object lesson. The student is impressed with the fact that the foundation work is all important. That because the band or ferrule is largely out of sight is no reason for its being in the least slighted, but that, on the contrary, it should be most accurately adjusted to increase the stability of the completed work and to avoid local irritation. In a word, he should strive to leave the neck of the tooth, after the band is adjusted, in as near a natural condition in its relation to the surrounding soft tissues as is possible.

After the root has been denuded of enamel, the student is instructed in the method of taking an accurate measurement of the neck of the root, as a guide in making the ferrule or collar. Then follows the soldering, shaping and fitting of the ferrule, the completing of the cap, adjusting, soldering and finishing of the tooth. The sections are then carried systematically through other important forms of crowns, their adjustments, etc., all of which is completed during their junior year.

At the threshold of the senior year the construction of an extensive bridge is taken up. The requirements of this case embody the conditions one would meet in most of the minor restorations (specimen shown). It will be recognized that if one can construct this complete piece of work, the difficulties of minor restorations will be readily met. Each section has its allotted time for the work, is supplied with a working card covering all the details of the piece, and each step is approved upon this card before the student is passed on to the next. The instructor insists upon promptness and regularity upon the part of students, and this is secured to a very satisfactory degree, for they have learned through previous experience that if they lag in this work they are dropped from the section. Throughout the teaching of this specialty, the student is impressed with the fact that success or failure in this work depends largely upon the observance of the two basal principles, first, judgment in application, that is, the professional judgment needed for determining where a bridge denture is admissible and what form should be used, and second, skill in construction, that is, in the execution of details.

The system previously alluded to of implanting either metallic or natural roots for the support of the artificial crowns, is carried out in this piece of work. The class is impressed with the fact that the preparation of the teeth and roots for the support of the bridge is essentially the same as in ordinary crown work, except that the trimming of the sides and the shaping of the root canals should be, as far as possible, in parallel lines in order that the finished bridge may pass readily to place. The construction of the bridge denture is divided into four distinct stages:

1. The making and adjusting of the crowns or so-called abutment pieces.

2. The construction of the intervening bridge teeth, or so-called dummies, from the selection of the porcelain facing and adjustment and attachment of the cusps to the completed teeth.

3. The assemblage of the various parts in preparation for soldering. Here it is that special attention is given to the matter of occlusion, the student being impressed with the fact that the life of the bridge depends much upon the proper occlusion.

4. The investment, soldering, finishing, placing and attaching of the denture.

After this work is completed and approved upon the cards, the construction of porcelain bridges is given, with the same attention to detail.

It is needless to argue the desirability of having the senior students perform as many practical operations in the infirmary as possible. The instructors in this department and the student with the case in hand consult with the instructor in crown and bridge work, so that the general schemes of instruction shall harmonize. In other words, there should be perfect harmony between the instruction given from the lecture desk, in the class room and in the infirmary.

Because a patient is so unfortunate as to have to apply to a public institution for treatment is no reason why he should not be treated with the same care and consideration as one in private practice, and all instructors should exercise the same care and be just as honest in giving advice and directions. We cannot overestimate the value to the student of the daily observance of ethical teaching and practice in the practical conduct of the college infirmary. Where ethical practice is not the rule, and the poor patients are handled mechanically and simply for the small fee, it places the college clinic upon the same basis as the quack establishments which degrade our calling. No argument, therefore, is needed regarding the importance of honest and ethical relations between students and their patients in the infirmary; and in no department of the school is the influence of the teacher more pronounced.

Discussion.

Dr. R. M. Sanger, East Orange, N.J.

I enjoyed very much Dr. Warren's most excellent paper and his clear and concise statement of how the subject should be taught, and I am so much in accord with him that I have little or nothing to say. When one is called to discuss a paper, somehow or other he feels that he ought to get on his armor with all the spikes on and try to jam them in somewhere; but Dr. Warren has left no place in which to jam those spikes. There is one point on which I lay special stress in this department, and I believe it is the duty of every teacher to emphasize this point, and that is, the esthetic side of crown and bridge work, and especially of crowns. It seems to me that there is scarcely a day that my eye is not offended by some one grinning at me with a great big gold crown, and the time has passed when gold crowns for incisor teeth should even be taught. Their need is so seldom, and the excuse for them so lame, that I cannot conceive how any self-respecting dentist will allow himself to place an all-gold incisor crown in anybody's mouth. I am so emphatic on this subject with my class that they rather laugh at it, and think I have reduced it to an absurdity. I go at it several times during the course, and in the senior class I say if they do that they need not consider themselves any longer protegées of mine. The subject is very near to my heart, and perhaps I waste a little time in my emphasis; but if anything I say will lead any of you to join the ranks of the non-gold front teeth men, I shall be amply repaid. I go as far back as the second bicuspid, and I think that is the limit. That is as far as we should come, and it is the limit to which we should teach our students to come, in order that we should lift our profession out of the ranks of the cheap advertising class. This is not criticism of Dr. Warren, but simply a desire to emphasize that one point in the teaching of crown and bridge work.

Dr. J. H. Kennerly, St. Louis, Mo. It has been customary at former meetings to extend the courtesy of the floor to our visitors, and I think we should follow that custom at this meeting.

The President The privileges of the floor are extended to our guests. We would be pleased to hear from Dr. Mitchell.

Dr. Mitchell, Philadelphia, Pa. I certainly appreciate the courtesy of the floor, but I did not come here to participate as an instructor, but rather as a listener. In the institution with which I am connected, we have a system of crown and bridge technic somewhat after the character of that just described in the excellent paper by Dr. Warren, with some few exceptions as to detail. We use a cast tin model, changing the character of it each year, and requiring the student to make it as part of the technic course. These models we think have their disadvantages, and we propose next year to use india-rubber models with celluloid teeth, because of the manifest advantages such models afford by approximating, as they do, the normal conditions prevailing in actual practice. The ultimate success of crown and bridge work is largely dependent upon at least a superficial knowledge of dental anatomy. I have the honor to lecture on these subjects, and the opportunity is most favorable to teach the two subjects concurrently. We endeavor to impress on the students the fact that porcelain facings are to be applied in bridge work with due consideration to the fact that structurally they are necessarily an element of weakness. While their full value in contributing to the appearance of the work is always to be realized, we do not permit the students to lose sight of the fact that they are essentially fragile, and that they serve nothing more than the purpose of a veneer, and as now largely used they are inherently weak and are not to be depended upon for any other use than that mentioned. We have a number of more or less valuable removable facings to overcome this difficulty. It has been a matter of regret to me that the crown and bridge operators have not placed a sufficient value upon what I consider the best facing ever made—a facing made with the pins arranged axially rather than transversely. I do not think there is anything better made; but unfortunately the bridge worker has not encouraged the use of them sufficiently, and they are largely off the market. I wish they could be restored to the market and properly appreciated, and be given once more their place in crown and bridge work. I thank you for your courtesy.

Dr. R. H. Nones, Philadelphia, Pa.

It is hard to discuss a paper when you agree with it, as Dr. Sanger said. What pleased me so much in the paper was that the essayist stuck to principles. He did not give various methods, but simply principles of teaching crown and bridge work, and I took from that in giving principles to students he wanted to give them the proper foundation. The thought seems to be among many men in studying crown and bridge work and in taking up the subject, that the moment they see a case it immediately means the cutting or absolute disfiguring of those teeth. I invariably teach my students, and it may not be in accord with some of the teachings of others, that it is not absolutely essential the moment you see a tooth for crown and bridge work to cut that tooth, extirpate the pulp and leave nothing of the tooth. I have seen many teeth ruthlessly sacrificed simply on the principle that something must be cut because it is crown and bridge work. I myself have never yet seen—all things being equal—a pulpless tooth as good as the vital tooth. I think that many in preparing teeth for crowns and bridges sacrifice the pulp simply because it is easier for themselves and the patients. I think that is the point more than anything else. With Dr. Warren's paper I am almost in accord. I may differ slightly from his methods, but the principles are almost the same as I carry out. First, I have the lecture, and I was going to say there is so much talk given from the lecture stand, which, while it is not valueless, the time might be better occupied; then, coming up to the technic, I follow myself, where I believe I give the most for the students' time and money. I started in dentistry at a time when prosthetic dentistry, of which crown and bridge work is a part, was looked upon a little more than to-day. A man went into the office or laboratory, and if he did not amount to something he did not reach the college. In those days almost entirely the teeth Dr. Mitchell speaks of were used. We had teeth that were of a natural shade, but they have been almost supplanted. To-day we have the teeth in make-up and shade very artificial, and why? Because the dental profession has demanded it. The large users of those teeth, the people who have built up the supply houses, have demanded these shades and these teeth; and while I have really loved prosthetic dentistry, I am commencing to dislike it, for the reason that I cannot get teeth that are suitable to the work, as in former years.

Dr. G. B. Snow, Buffalo, N.Y.

Crown and bridge work is out of my line. The whole subject has come up since I have had much to do practically with dentistry; but I believe there has been more mischief done with bridges than anything that has come up in dentistry. I believe many bridges are put in where teeth are ruthlessly sacrificed, where a plate would have done a great deal better. (Applause.) I may be an old fogy, but that is my idea. There is another thing about it, that it is a place above all where the students should be taught to be exact. The teeth are not properly prepared, the crown is put on in such a way that it does not fit the neck of the tooth properly, and the consequence is decay and an early loss. Often too large a bridge is put on for the foundation. Take a wisdom tooth and attempt to put on a bridge to support the two other molars, and in a man who has good, strong masticating powers the bridge will loosen the attachment, and in a little while the whole thing will come out. We should teach students to be exact and precise about what they do. If we can do that, we do good work; otherwise our work is to a certain extent a failure.

Dr. E. Hillyer, New York

Dr. Nones spoke about devitalizing the tooth. There are many crowns that are taught per force of circumstances to students which are necessarily baneful; but we must teach them because they may be expected to practice upon those lines possibly later on when they go out. If those crowns are going to cause trouble subsequently, would it not be better to face the trouble and teach the student from the beginning how to treat such teeth and devitalize at once? It does not seem as if sentiment should cause us to save a nerve that is liable to cause trouble afterwards. Is it right that we should try to conserve those nerves under those conditions?

Dr. R. H. Nones, Philadelphia, Pa. I did not wish to convey any such idea. If the pulp is to be taken out, of course you would take it out; but I did not mean that the moment you see those teeth you must cut them away and sacrifice the pulp, simply because you want to place a crown or bridge there.

Dr. John I. Hart, New York The whole question at issue, I think, depends on how much cutting we are going to do. If the tooth is at all bell-shaped, we had better meet the condition at once, and extirpate the pulp. Perhaps when we cover up that tooth the pulp will die, and it is embarrassing to us as operators. When we are compelled, owing to the shape of the tooth, to modify the shape and do considerable cutting, it seems best to meet the question and devitalize. If the tooth is so shaped that it requires but little cutting then leave matters alone and do not devïtalize. But I think we ought to teach that where there is considerable cutting to be done, they should start in and devitalize the tooth.

Dr. R. H. Nones, Philadelphia, Pa. That argument I cannot understand, why in those immense gold and amalgam fillings they do not extirpate all of the pulp. Why put in these immense fillings that will be harder to take care of afterwards?

Dr. J. Q. Byram, Indianapolis To answer Dr. Nones, it is a clinical fact that the crown of a tooth with a vital pulp will remain better; but after bridge or crown work is necessary, where we are covering these teeth, then that feature is not to be considered. Now, Mr. President, it is principles that we want to teach; but my experience has been that we must take radical stands as teachers on some lines, in order to emphasize certain points to our students. I do not know how it is in the East, but in the West all of our students do not follow our teachings after they graduate; and as I look down your streets in New York, I should imagine all your students do not follow your teachings. The point I wish to make is this: Take a case as Dr. Warren has outlined in the last chart, and teach the student to crown that tooth with a vital pulp, and what is the result? An impression is made on him that all pulps should be conserved. The graduate goes out and inserts gold crowns without proper root preparation. I say it is necessary for us to take the other extreme, for after a student graduates, we know he may become careless soon enough. I would rather be classed as an extremist in pulp devitalization than in pulp conservation for bridge work. There has been a question in my mind as to whether bridge work should be taught in the second or third year. We did teach it in the third year but, now we teach it in the second. Our prosthetic course is arranged so that the first year consists of plate technic work, the second year entirely crown and bridge work, the third year entirely porcelain work, including platino porcelain bridges and continuous gum. There is one point on which we do not lay enough stress, and that is articulation in bridge work. It has been our custom for a number of years to use none of the systems of ready-made dies in our institution. We require every student to carve every cusp he uses, not only in technic work, but in practical work, not that he may construct a more artistic crown or bridge, but we want him to be trained in carving for the porcelain work. I believe we do not lay enough stress upon the construction of the bridge on anatomical articulators. In most colleges, ours as well, we allow the student to buy a little crown articulator. I think the use of such an articulator should be prohibited in all institutions, and all crown and bridge work should be constructed on anatomical articulators.

Dr. John I. Hart,
New York

I think that the profession should be a unit on a question of this kind. Some of us must be radically wrong to disagree on the subject, and it is not only in this body, but wherever the subject is discussed. We go off and follow our own lines. The argument has been brought forth that if we inserted a large gold filling we might not devitalize. The conditions which brought about the necessity for a gold filling would cause that pulp to become more active and produce secondary dentine, and the pulp would to a large extent protect itself. At any rate, before inserting a large compound filling there would be ample room in the cavity to introduce a considerable layer of some intermediary, first varnishing the pulpal wall and then introducing oxyphosphate of zinc; whereas if we cut off a slab of tooth substance as there shown, and the crown fits as it should, there is room for merely the thinnest film of oxyphosphate, and consequently that pulp has little or no protection. I want to answer the previous speaker that I think it unfair to inject into the argument that we might introduce a large filling. I do not think we would place as large a filling as that without putting in a layer of intermediary non-conducing material.

Dr. H. E. Friesell, Pittsburg, Pa.

We believe in teaching crown and bridge-work from the operative standpoint, rather than from the prosthetic. The satisfaction gained by the patient from a crown or bridge depends on its adaptation to the other dental tissues. Therefore, we teach it from an operative standpoint; by lectures first, succeeded by technic demonstrations, and completed by personal supervision in the infirmary. The demonstrator in crown and bridge work in the last half of the senior year spends his time in the infirmary and oversees the actual placing of crowns and bridge work. The course runs through the junior and senior years. During the junior year they are taught the principles of crown work. The class is divided into six sections. One section is given an hour a day under the head demonstrator. Those who are not able to finish the work that day can come into some of the other sections, or finish it under some other demonstrator. In the senior year the technic work is based entirely on bridge work, both fixed and removable, and there the class is divided into six sections, and each gets an hour a day. Each student gets one hour a week under the special care of the demonstrator, who makes it his special work to demonstrate crown and bridge work. We have a special chair of dental ceramics, the professor and one demonstrator teaching all our porcelain work; and porcelain bridges, crowns and inlays come under that chair. We teach that the foundation of bridge work, like the foundation of almost every other dental procedure, is based on dental anatomy. We try to teach dental anatomy to the student from the time he matriculates until he is graduated. We impress him with the fact that the most important thing for him to learn is his Black's " Dental Anatomy." We would like our students to know it from the first page to the last, and we want them to apply the principles they learn from reading and studying that book. The next important point we try to drive into them is attention to details. There are about twelve cardinal principles in crown and bridge work, and all the other work is in relation to those twelve principles. We specify certain instruments, and a man must have those instruments. He must have the proper outfit. The anatomical articulator is required in that outfit. I lecture on crown and bridge work, and I teach my students as I practice, that is, to give the pulp the benefit of the doubt. This is not bearing on the paper, but was brought up in a discussion. Do not touch the pulp until there is a reasonable doubt in your mind whether it will remain quiet under the operation. If there is doubt, take it at the best time; but if there is any reasonable probability of it remaining alive, let it alone. If it does die, it is not much trouble to remove a bridge.

Dr. R. H. Nones, Philadelphia, Pa.

I have a faculty of making myself misunderstood. The more I say, the less people know what I am talking about. I invariably speak of what Dr. Snow mentioned in my lectures on crown and bridge work. I always try to impress the student to thoroughly cover the ground and see whether there is anything better to take the place than a crown or a bridge. I say that more from the standpoint of specializing to-day. We have so many specialties in dentistry and medicine, that we are only too apt to say, " Put a crown or bridge in that mouth." As to the extirpation of the pulp, and this is not foreign to the subject, because in a moment I will bring it back. I am trying to give principles the same as Dr. Warren. His whole thought was principle, principle. When I attended the Philadelphia Dental College, the Faculty of the college was very dear to me—a Faculty of teachers who taught principles. Among them was the man who presides at this meeting to-day, and none can teach prosthetic dentistry better than he is doing. We also had a dear old man who was beloved by everybody—Professor Flagg. He taught principles. He used to get the men together into little classes—medicament and napkining classes, he called them. That was one of his pet habits, and I do not think anyone could do it like he could. He seldom, if ever, used the rubber dam. One young man asked him: " Professor Flagg, suppose you could not put the napkin on a tooth?" " Oh," he said, " but I could put it on." " But suppose you could not in a certain case, what would you do?" "I would dam(n) the tooth," he replied. In referring to this discussion, if I could not do anything else, I would take the pulp out.

Dr. S. H. Guilford, Philadelphia, Pa. There was one little point that impressed me, and that was the question of devitalization or non-devitalization of the pulp. When this Association met in Philadelphia, six or eight years ago, we had a paper on the subject by Dr. Goslee. We had many men from the middle West and far West, and they expressed themselves in regard to this question of devitalization. They were apparently unanimous on the subject, and it seemed, according to their ideas, that anybody who did not devitalize a pulp before crowning was committing a crime. We men in the East felt a little guilty. To-day there are more Eastern men here, and you see the same spirit predominant—a tendency to save the pulp. I am sorry Dr. Brophy is alone from his part of the country. It simply shows how different sections of the country have different ideas.

Dr. Geo. W. Warren, Philadelphia, Pa. It seems needless for me to say that I am very much pleased with the discussion brought out by the paper. In reference to my position regarding the wisdom of preserving the vitality of the pulp, in preparing abutments for bridge work, I only have to say it is based on a considerable experience in this class of work. Before coming to this meeting I took the trouble to look up my records, and of the many bridges placed in position during the past fifteen or sixteen years without disturbing the pulps, I could find but three teeth in all my records where, to my knowledge, the pulps have died. Of these one was a molar which was very much broken down on all sides by decay. This tooth was used as an abutment for a bridge. The dentine was prepared as carefully as though we were going to fill the tooth, and I gave it, as I always do in such cases, a treatment of nitrate of silver. It gave no trouble in shaping up, but in six months' time there was a devitalized pulp. This, however, I believe would have occurred just the same under a filling. That is, that the crowning was not responsible for it. The other two cases were bicuspids, where, for esthetic reasons, I had entirely cut off the labial surface of the teeth so they might be replaced with porcelain facings. One of them, by-the-way, was for an elderly gentleman. The tooth was badly broken down by decay, and there was evidence of pulp calcification which we frequently find in these cases, seldom being called upon to put in extensive bridges for young patients. In this case the tooth was so badly gone that, as it proved, there was not structure enough to hold the crown securely in position. It becomes loose, was removed to reset, and in a few months' time had the same trouble. Then I decided to drill into the root and devitalize the pulp, but found the pulp was so extensively calcified that I decided to explore no farther, but put in a short, heavy pin. Some months ago the patient returned with evidence of a developing abscess, showing that what remained of this pulp had died. These are the only three cases that I have a record of where the pulps have died, and they are all extreme cases. I brought this chart over especially to assist in bringing out the discussion. (Illutrating.) Where we have a third molar, as shown here, the other molars having been lost some years, it is necessary to do considerable cutting in order to get a proper adjustment of the crown and have the bridge go into position. A little over seventeen years ago I had just that condition on either side of my mouth. As a boy I lost a considerable number of teeth, being in a position where they could not be well cared for. After worrying for a time with a plate, I had these teeth restored by bridging. The work was extremely painful. The third molars which had tipped over, as shown in the illustration, were righted up with stones and discs, and the operation was extremely painful. They were then treated with nitrate of silver, and I am wearing the two bridges placed in position, as I have stated, over seventeen years ago, and the pulps are just as vital as when the operation was performed. I have since that time placed many of these, usually, however, for older people. In some cases, where we have an extremely sensitive condition, especially over a horn of the pulp, we can isolate the tooth and spray it with a little chloride of ethyl, when with a stone the tooth can be quickly brought down to the desired point. That has been done many times without any after-trouble. I always treat all sensitive surfaces, however, with nitrate of silver, after the tooth is shaped to my satisfaction. I am, as you may see, a thorough believer in pulp preservation. Dr. Snow's remarks concerning mistakes in using bridges I think excellent. There is no doubt too many—especially the younger men—feel that if two or three teeth are lost, it simply means an opportunity for a bridge. This is not always the case, as it is better under certain conditions to advise a neat-fitting gold plate. However, it is important in every phase of practice that we should have clear and accurate ideas, and that our deductions should be based upon actual clinical experience and sound judgment.

General Dental Education.

By Dr. Chas. M. Ford, New York.

The first essential to successful work in the education of dental students is to secure a higher and uniform standard of preliminary educational requirements and to insist on the preliminary requirements being fully completed before the student is allowed to begin his dental course.

In New York State the present preliminary requirement of forty-eight counts, or four years of High School work, proof of the successful completion of three years of which must be furnished before the student can begin the first year towards the degree of D.D.S., will assist us greatly in raising our educational standard by giving us a better trained set of students at the beginning of our work. This requirement can be much improved by designating a well-selected set of subjects, which the dental student must take during his third and fourth year's work in obtaining the dental student's certificate. Included in this list must be a liberal number of hours of suitable technical work, thus starting the preparation of the eye, brain and hand for the future dental work.

Given our students with a good fundamental education to start with, the task before us becomes much easier.

The three years' course of eight full months per session will be our basis for the present consideration, for it seems to me that we must first put our increase of time on the length and thoroughness of the preliminary work. When we have secured the correct balance of preliminary work, then and only then can a four years' course be maintained to the advantage of the student, and it is from the basis of the best interest of the student that we must consider this matter. In other words the extra year can better be expended to-day in preliminary education than in adding one year to the course in the dental colleges.

When the time comes that we can demand a uniform preliminary requirement greater than four years of High School work, completed before the student enters upon his dental course, then and only then can we advantageously increase the number of years in our dental course.

The methods of dental instruction have materially changed within the last fifteen years. From the old practice of placing freshmen, juniors and seniors in the same lecture-room and repeating the same course of lectures to all of the classes for three years in succession, various modifications have been introduced from time to time. Probably the greatest change of the present is toward the method of substituting recitations for lectures.

The mixing of classes has been largely done away with, and in most institutions the classes are separated in recitations and lectures. This is certainly a very great stride forward; for by this means the instructor is able to grade his course, save much time for his patients, and produce results much more satisfactory to all concerned. In the realm of instruction the personal element is a very decided factor in success. Comparatively few men are good instructors, and the quicker our large institutions adopt the plan of selecting teachers according to the results produced in the class-room and not according to the great reputation or amount of influence that a man may have, the quicker will our educational results take rapid strides forward. The man who can induce the student to learn well the groundwork of his subject and then place upon that groundwork a substantial superstructure, is the man for the professorship in that subject.

The professor should do the essential work of instructing each class in the foundation work of his subject, for on the proper laying and shaping of this foundation work depends largely the success of the average student. The method of accomplishing this result will vary greatly, and the instructor himself must select his methods. One instructor will find that he can obtain better results with his classes by lecturing to them for one-half of the hour and then quizzing them for the remaining half-hour on the subjects lectured upon the previous day; while another man will accomplish the same result by giving his class a certain lesson in a text-book, or abstract of a text-book, and requiring the members of the class to learn the lesson, and then at the time of the recitation, as occasion demands, supplementing the text by short explanations, and thus impressing certain points upon the minds of the members of his class. In reality how nearly these two methods coincide. In the one the ideas of the instructors are given largely to the exclusion of other opinions, while in the latter the ideas of the author of the text-book are brought out and the instructor's opinion and corrections added. Both methods have their merit, and the preference of the instructor and the nature of the subject will largely determine the method to be selected. In most subjects where good text-books are available the recitation is better and more effective, and can well be supplemented at intervals by short lectures.

If the text-book is not sufficiently condensed to suit the case in hand this defect can be overcome if the professor will write a synopsis of the subject under consideration and give it to the students as a guide to their study. The use of a synopsis has many advantages because most of the text-books of a dental curriculum are too large. The synopsis gives the student a basis for his condensation of the text, and produces good results. This is the method that I have followed for some years with my classes.

The method sometimes used where the professor lectures to the class and at some future hour has his assistant quiz the class on the subject-matter of the lecture, is very ineffective.

The one giving the lecture is the only one who can quiz on the subject-matter of the lecture with good results, for the ideas of the assistant creep in and the student becomes confused.

By turning over the quizzing of the class to a subordinate the professor furnishes the class with inferior instruction in the most important part of the work. It is the professor, and he alone, who should give the instruction to the class upon the essentials of his subject, whether it be done by lecture and quiz or by recitations, and he should not relegate this work or any part of it to subordinates.

In quizzes and recitations the classes should be divided into sections of thirty, not to exceed fifty in number.

In such sections the personal element of instruction is brought out, the professor learns the peculiarity of each student in his class, and can draw out and correct the errors of each individual, producing results not to be approached in classes of a large number of students.

Various methods have been tried to keep the whole class of one hundred, or possibly one hundred and fifty students, interested, but they have all been failures, great or small, largely depending upon the capabilities and versatility of the quiz master. If you have not tried the small class method take one class and divide it into sections of about thirty men; push these sections, giving each section as much time as you formerly gave the whole class, and after a two months' trial you will never consent to return to the large class method of teaching. It is true that you have given more time to the class in the class-room, but it is the benefit to the student and the result that we are seeking, and in so doing we must lose sight of the instructor's time to a great extent.

As stated before, the faculty must be made up of men having the gift of teaching, who can compel, as it were, the student to grasp the basal elements of the subjects taught. These men are largely found in the middle class of hard-working men, who are known as all around men of good judgment, not in the class of brilliant men who have attained a world-wide reputation in some special line of work.

The members of the faculty must also be able to work in harmony, for one man not conforming with the general plan of the faculty will materially injure the work of the whole body. Students placed under the instruction of such a faculty for the groundwork of their college course will advance rapidly. The work of the faculty must be well seconded by lectures, and in some instances by short courses of instruction given by men of large experience in their specialty.

To this end the faculty should be aided by a large corps of lecturers and clinical professors. In this field after the foundation has been laid the specialist is of untold value and the combination is essential.

After securing a teaching staff, then follows the arrangement of a schedule of recitations and lectures giving the best division of time for securing the broad education of the student.

The first two years of the college course should be largely given over to laying the foundation of the student's work in each of the regular subjects, and should consist of hard class-room and section work carried on by the professors of the regular branches.

It is of the greatest importance that this work should be well carried out, as a class poorly started in these subjects will continue to do poor work throughout its college course. Most of the work of the first two years can best be accomplished by dividing the class into sections of thirty students and instructing the sections by recitations and demonstrations, or by lectures and quizzes, as the subject may warrant or the instructor may elect.

During the third year the higher branches must be completed, and much special instruction in the dental subjects must be included.

The didactic instruction may well be arranged in the following order: In the first year the foundation work in anatomy, physiology, chemistry and physics, operative and prosthetic dentistry, must be pushed forward and the study of histology completed. During the second year the instruction in anatomy, physiology, chemistry and physics, and the foundation work in the dental subjects must be completed, and the study of materia medica and oral surgery begun. In the third year the study of materia medica and therapeutics and oral surgery must be completed, and the regular instruction in operative and prosthetic dentistry must be broadened, by a large number of special lectures and demonstrations on important dental subjects.

In the didactic portion of the operative and prosthetic course of the three years the instruction must be so graded that it will keep pace with the work of the different parts of the infirmary and of the dental laboratories.

Much benefit to the student may be obtained by the introduction of written recitations, in all of the regular subjects of the course of instruction, at intervals of from four to six weeks throughout the session. These written reviews prepare the student for the final examinations and enable the instructor to judge of the progress of each student at frequent intervals.

The mid-term and final examinations in the didactic work of each subject are essential to the grading of the students of the different classes. Yet except at the completion of each branch it may be as well to excuse from the examination all students having an average in their class-room work for the session of over 85 per cent. This is an incentive to good, regular class-room work throughout the session, and will accomplish more than the examination in keeping up a high standard in the college.

Special Laboratories.—Among the special laboratories that must be maintained those of physics and chemistry must be well equipped, and the special courses in these subjects must be completed before the end of the second year.

In histology the instruction should continue through the first year and consist of recitations in which the characteristics of the different tissues of the body are studied, especial attention being given to the structure of the teeth. These recitations are followed by a practical course of instruction in the laboratory, where the student studies the processes of preparing the different tissues for examination and the characteristics which they present under the microscope.

The pathological course following takes the place of histology during the second year, and here the student studies the pathological conditions found in the body, and in the laboratory these conditions are shown under the microscope and compared with normal tissues.

In bacteriology the instruction should be given in the second year, and should consist of a thorough study of the characteristics of the different forms of germ life, especially of those forms found in and about the mouth. This course is completed by laboratory work in which the student studies the growth, appearance and preparation of the different species for examination under the microscope.

In the materia medica laboratory during his first year the student is shown the appearance and characteristics of the different drugs in common use.

The instruction in metallurgy is given by a course of lectures illustrated by practical work in combining and separating metals in the metallurgical laboratory.

Infirmary and Dental Laboratories.—Here we have the key to a successful course of dental instruction, which should consist of a thorough graded course of practical instruction occupying at least three hours of every workday throughout the college year.

To facilitate the successful operation of this department of instruction, great care must be exercised in the selection of the members of the infirmary staff, as on the efficiency of their work depends much of the success of the future work of the students placed under their charge.

The infirmary work of the first year is largely foundation practical work in the operative and prosthetic laboratories, the time being divided about equally between the two laboratories.

During the early part of the second year the operative work in the laboratory should be perfected and the student sent to the chair for cleanings, treatments, and the preparation of cavities, and later on for amalgam and small gold fillings.

The regular prosthetic work should be mastered and completed during this year, the latter part of the year being devoted to practical work for patients.

In the third year the greater part of the student's time in the operative department should be devoted to the treatment of operative cases at the chair. The instruction should be painstaking and thorough, covering all of the important operative procedures.

The prosthetic special work should be completed, especial attention being given to the making and setting of crowns and bridges.

The practical instruction of this year should be supplemented by a large number of clinics and clinical instruction embracing all of the special operations about the teeth.

The student should be passed from one department to another in his year's work as fast as he becomes proficient in the work of that department, and not because the time allotted to that department has expired. This procedure can only be accomplished by a thorough graded course of instruction for each year.

The motto of the whole infirmary course should be quality not quantity, and the student should be held to each piece of work until he has mastered that piece of work, for thus and thus only can he become a successful operator and practitioner.

Discussion.

Dr. T. W. Brophy, Chicago

I regret very much that Dr. Kirk is not here to open this discussion, as the programme calls for. The essayist has been remarkably successful in covering almost the entire field of practical work in the college course of instruction. I wish to state that the position I hold in regard to the time spent by dental students is the same now that it has been for a number of years. The dental student may acquire a great deal of knowledge in a period of twenty-four months of continuous college work; but it does not require any argument at all to prove that he would acquire more knowledge with eight months added, and he might add to advantage still more. I believe the course of instruction in Norway for the schools of medicine is ten years; in Italy I think it is eight years, and in some of the other countries six and seven years. We must keep in mind that we are a new country—a young country—and the professional men who have entered practice in this country have performed an important duty to mankind. If the standard that some seek to establish had been required when some of us were beginning our professional studies, we would not be here now; yet we have done our best to accomplish certain ends, and succeeded in some measure, although not to the extent that we would all like. Of course, the course of instruction laid down by the essayist is most excellent. He first speaks of the preliminary education. We require a good education of every man who desires to assume the duties of a student in professional schools. We require that those students shall have passed a certain course of study to fit them for entrance upon professional study. We speak of the forty-eight counts and High School graduation. Perhaps it has not occurred to all that the accredited High Schools, that is, the High Schools of our country whose graduates are admitted to our high class universities, give a course of instruction that thirty years ago would have been a credit to any of our best universities. There is many a man to-day in active professional life, who graduated from our oldest and best universities, who never acquired an education equal to that given by some of our High Schools at the present time. I believe a student should pass through this course of instruction given by our High Schools, or its equivalent, and by that I mean he should have an education equal to that given by the High Schools. Of course, we all know there are men who possess education of a high order who never attended a High School. In fact, there are men—not so many in this country as abroad—who never attended school at all, who have had private tutors, and who have attained a high degree of scholarship. It would be shortsighted on our part if we laid down an iron-clad rule that a man could not enter a college unless he possessed a diploma from an accredited High School. So we must accept only men who are educated. Our schools have fixed a standard of High School graduation, or its equivalent, that equivalent to be passed upon by a state superintendent of instruction. As to time, we believe in having enough time. The time question has been agitated more in dental educational circles the last few years than all the other subjects combined. It has been the subject of some very unpleasant discussion sometimes, bordering on a state that every good citizen and earnest educator should deplore. We all want to accomplish the best results, and we have tried to arrange matters in a way that all might proceed along certain lines and advance as rapidly as possible. The late Professor J. Adams Allen, President of Rush Medical College for more than twenty-five years, used to say that education and educational methods were like everything else; that they must be the outgrowth, a process of evolution, and that they must be developed from what they are to a high standard. A house must have its foundation laid, and if it is to be a good house the foundation must be a good one, a deep one and a broad one. It would be folly for anyone to attempt to build the second story until the foundation was properly laid; and so I think it has been with this matter of dental education. Some have desired to rush along with the structure before the cement was dry, before the walls were capable of holding the superstructure together. This will not do. It must be by a gradual, substantial and sure growth of permanency. I believe with all the agitation, confusion and juggling that has been going on, that we are getting down to a solid foundation. We are building upon a foundation that will support the superstructure and support it well. In the early part of the day, when some topic came up—I think it was the result of a question that was asked about time—I said I believed we should take all the time that is required to equip the young men properly. I made the statement then, and I repeat it now, that this question of time pertaining to this great subject of dental education, and its discussion, has not been properly put. The way it has been put and discussed has been misleading; not that those who make use of those terms meant to be misleading, but inadvertently their utterances have not been understood, and have really been misleading. It is a very easy matter for a man to say a course of four years is longer than a course of three years, but such utterances do not mean anything. These courses have never been in years. There has never been an institution in this or any other country that has conducted a course of instruction in years, except, perhaps, the Rush Medical College, where the instruction is continuous; it never stops, except during two weeks. If there is any other instance of the kind, perhaps, it may be in the Johns Hopkins University. A young man may come in at any quarter and at the close of it he is given credit for one-third of a course of instruction, to be applied at any time. In our dental college work we cannot do that. We must conduct our courses continuously for a period, and then call that a course. It has been said by men who are not well-informed that only the endowed institutions of the country—supported by endowments—should receive the support of the profession at large. Such utterances are too unjust to receive our consideration at all. There is not a dental college on this continent, certainly not in the United States, that receives an endowment of a single dollar. All are dependent upon the receipt of the students' fees for their maintenance. Without the students' fees they could not exist, and so every dental college and university dental department, those attached either in fact or in name, have no advantage over the others, as far as funds are concerned. If I do not state facts, I would like someone to correct me. This subject of so-called commercialism in dental schools discussed by men who do not know anything about it, but think they do, has been spread all over the world. Let us look it squarely in the face and tell the truth about it. This is really the most important phase of the question, how our dental institutions shall be maintained, and how we can make them stronger and stronger, and secure teachers better and better, as the evidence here abundantly shows. When I think of the condition twenty-five years ago, and the men engaged in teaching, and compare them with the men of to-day, there is scarcely any room for comparison. True, we had men who made their mark and will live in history as teachers, and who did not consider the question of compensation. It was a question of how to teach, and how much they could teach. Teachers at the present time do not make the sacrifice they did twenty-five years ago. There is a man right here (Professor Littig) who has spent days and nights during the past thirty years to solve the question how best to teach, and he received no compensation for it. The count system is really the only one by which we should gauge our young men or mark them for admission. It is the only fair way, outside of the necessary educational certificates they may bring. No matter whether you believe in it or not, it will be used in all our professional schools in spite of those who want to stop it. It is the only rational way. There is a phase of college work that has presented itself to me, and the more I think of it the better I think of it. There is not in some institutions the close relationship existing between professor and demonstrator, and demonstrator and student, that should exist. I believe the demonstrator's function is far more important in many respects than that of the professor, and really, if I were to carry out a course according to my ideas, I would have the demonstrators bring the work to the students, and have the professor cognizant of every step; and then the function of the lecturer should be to crystallize in the most condensed form, and present it to the student and fix it in his mind, so that he will not be likely to forget it. I must necessarily be somewhat personal in this respect in stating the course pursued by Professor Johnson in his work in operative dentistry. He has frequent conferences with the whole staff of demonstrators in the operative department, planning the work and reviewing the work of individual students. All the men that are a little careless or tardy in their work are brought up, and the question discussed with them. A number of years ago Professor Johnson said to me, "What am I to do with these seniors, two or three lectures a week, after we have the principles well laid down?" I answered, "Dr. Johnson, the best service you can give them is to follow your day in the infirmary by a lecture." He spends every Thursday afternoon in the infirmary watching the mistakes, going among the students and criticising their work, and becoming acquainted with it. I said, "When you go to your five o'clock lecture, have your notes with you and tell the boys wherein they have made mistakes." I think the kindest act of any man is to call the attention of his friend to some error or defect in his ways or in his work, and when it is done in a kindly spirit it is always accepted and appreciated. I believe that kind of teaching, the calling of the attention of the students to their errors by the head of the department, is one of the most important of his functions. The question of text-books is always an important one, but the advance of our educational work is more rapid than we realize, and text-books that were good ten or fifteen years ago are now nearly obsolete. Text-books should be revised and new editions gotten out to keep pace with the times. The question of harmony: I would rather have an earnest man, a man who is not a shining light as a teacher, teach a class of students, provided he had no elements of discord in him, than a genius who is a continuous fault-finder. If he is faithful and meets his class on time, and never misses a lecture, he will accomplish more than one whose continuous fault-finding stirs up discord. There is not a school in the country that can afford to have a disorganizer on its staff. It is better to let him go, and put in some other man. There is an example in the recent war between Japan and Russia. There never has been a thing in the Japanese Army that savored of discord, and you know what the consequence was. As to examinations, I think it would be better to have them each month. The quiz is more important than the lecture. Each man should write out what he has to say. I asked my class recently to write about three pages on the subject of ankylosis of the tempero-maxillary articulation. There were a lot of mistakes, but those mistakes were corrected, and those men, having that subject on their minds, had a chance to correct the mistakes at the time of the lecture. If I had not done that, these men would have failed in that at the final examination. The place to correct the mistakes is in the college. If they do not know it, see that they do. I said to the students: "One thing I want you to do is to form yourselves into small quiz classes, five or six together. Follow up those lectures, and quiz one another; and if you do not agree, submit your differences to the professor and have them adjusted. Let those lectures be subjects for your quizzes, and after you have quizzed one another, if you agree you are generally right." When an army marches along, some are in advance and some in the rear. So with the class. How much can an examining board do in going over those subjects in examining a lot of students? It is mostly theoretical, and errors sometimes creep in on the part of men who are highly skilled, and they are rejected. Under the present plan, in the brief period of time allotted, it is impossible for them to acquire the knowledge that the faculty has of those men that have been living with them for three years. I have already talked a long time, but there are some phases of the paper that I cannot enter upon. The questions of the laboratory work and bacteriology, I believe, are very important. The time when it is most deeply impressed on the student is in the senior year—what bacteriology has to do with infection and how to sterilize the instruments, and the carrying of infection from one patient to another. Even though he should do this in his second year, he should have it impressed upon him in his senior year, so he never will forget it.

Dr. E. Hillyer, New York

Do I understand the professor to say he would restrict the quizzing to the head of the department alone?

Dr. Ford, New York

Just on the professor's lecture.

Dr. E. Hillyer, New York

I do not think that was made very clear. Quizzing should be extended throughout the whole course in every class. In the matter of examinations, as well, there is not a class of any kind that should pass without an examination, unless it be a class wherein it is quite evidently superfluous. The quizzing brings out what is actually lacking. In our department the quizzing is in my hands, while Professor Littig is present. We are both present at every lecture. While my ideas are the embodiment of his, the quizzing is my province. Perhaps we have an advantage in that, with the quiz going on, Dr. Littig can interject anything that escapes my attention.

Dr. J. B. Littig, New York

I would like to make a little explanation in regard to our quiz. We are not accustomed to ask one question of one student at a time, but call one man down and have him sit in front and ask him questions until he fails to answer or satsifies us, and then we call another. We thus avoid any possibility of others giving aid to the one being quizzed. If I have one away from the others, and put the question to him so the whole class can hear, the entire class has a chance to reap the benefit of the questions and answers. We go right straight through, taking one man at a time. When another question evolves from one Dr. Hillyer has given, I suggest that, and we thus conduct it together. I think the class gets a greater benefit from that than from the elctures.

The President Do you have the student leave his seat and come to the front?

Dr. J. B. Littig, New York Yes, he comes right to the front bench, where he can be entirely independent of his surroundings, but with his back to the class to free him from embarrassment.

Dr. H. M. Semans, Columbus, Ohio I am one of the students who was quizzed by Dr. Littig, Dr. Hillyer and Dr. Weisse, and I will never forget it. I remember very well running up to forty-eight or fifty-two questions on the part of Dr. Stein, and I sweated every bit of blood that there was in me (and there is not very much, either). The relief came to me when he turned to the class and said, "Do you think he has got enough?" As I look back now, I know it was as fine a drill as anything I ever had, that individual quizzing before the whole class, and no let-up until you were either floored or satisfied the class. I would like to speak along the line Dr. Brophy brought out, and that was the presence of the head of the chair in the clinic. Our lecturers and our professors spend one, two or three days each week through the afternoon session doing individual work in their departments in the clinics. For instance: Operative technic, 30 hours; crown and bridge work, 24 hours; operative work, 12 hours; pathology, 4 hours; orthodontia, 12 hours; porcelain, 8 hours; anesthesia, 8 hours; oral surgery, 4 hours, etc.

Dr. J. B. Willmott, Toronto, Canada I have had nearly thirty-one years' experience as a teacher in a dental school. In the early years the classes were small and the teaching staff was few in numbers compared to the staff, as announced in the calendar, at least, of our modern schools, which numbers from twenty-five to fifty members. I am not at all certain that we are gaining in teaching power in proportion to the increase in number of our teachers. I am not sure that fewer men, giving more time, would not accomplish better results than the division and the sub-division of the division of subjects which has now become common. I suppose, however, it is too late in the day to make a suggestion; it would be rank heresy. So far as the interest of the students is concerned, if we had a few competent men who would give their whole time, and were sufficiently remunerated, we would get better results. It is very desirable that the professor of operative dentistry should always be present in the infirmary and not only on one day in the week, and do a good part of his demonstrating himself. If the professor of prosthetic dentistry could do his own demonstrating, we would also get better results than we ordinarily do. That, of course, involves giving up private practice and the necessity for remuneration from other sources. I have been impressed with this fact, that it is not fair to expect the best results in teaching from men who are not remunerated. I think that is the weakness of the whole Continental and English system, that the teaching is not remunerated sufficiently. I want to speak of something which may not be of present importance, but looking to the future, as to the question of the preliminary preparation, a certain amount of manual training before the certificate was accepted. That would involve a young man choosing his profession when he was thirteen or fourteen years old, when he would be totally incompetent. He would have to choose his profession when he entered the High School. I am afraid we will be obliged to accept general, rather than specific, courses. If we can reach a standard which will require of all dental students that amount of general information which will be equivalent to matriculation in a university faculty of arts, that is probably as far as we can go, in a good many years to come, towards reaching the ideal preliminary. I made a suggestion to the President of our own Board of Directors, but I do not know whether they will see their way clear to carry it out. I suggested that the Board, who control the finances, should make a grant to each head of a department, to enable him to spend a week in visiting other institutions, and seeing how the teachers in his department in other institutions conduct their classes. I do not know how that amount of funds could be used to better advantage than in comparing his methods with methods of other teachers. (Applause.) If any of the gentlemen present come to our institution, we will show them all the courtesies we can, and try to impress them with the superiority of our methods, although probably they would go away well satisfied with their own. I may say that I made that financial suggestion on the supposition that the teacher could not afford it on his own account. If the college wished to get the benefit of superior teaching, they should put him in the way of getting this additional information.

Dr. E. Dubeau, Montreal, Canada

I think what I have to say may be of interest to this Institute because it pertains to education. I have here an article published in France last month, speaking of dentistry all over the world, and they put American dentistry at the bottom of the list. I think it is an insult to American dentistry, because it has always been considered the highest in the world and I think your Institute should take action on it. In France they divide dentistry into two parts; they have the stomatologists and the odontologists. The stomatologists are men who have just finished their course of medicine and then practice dentistry. Some take a course, some do not, and they are then regular dentists—but poor dentists. The odontologists are the surgeon dentists who have taken the regular dental course. Dr. Robin, of Paris, who is a physician practicing dentistry, wrote that article, and I think he took a year of dental work at the University of Pennsylvania and then went back to France and practiced dentistry; so I do not see why he hammers on American dentistry. He gives 20 marks for preliminary education; 15 for anatomy, and for embryology he just puts an interrogation point; for general pathology, 15; for chemistry, 15; anesthesia, 15; hygiene, 15; dental pathology, 55; mechanical dentistry, 65, and operative dentistry, 70. He gives 300 to American dentistry out of 1,000 points. He gives 1,000 points to the stomatologist, who is a physician and not a dentist. He gives 1,000 to the English dentist, 950 to the Swiss, 765 to Belgium, 345 to France and 300 to America. I think it is a real insult to American dentistry. Some of the writers in the dental journals should take occasion to answer such a statement.

Dr. R. T. Oliver, West Point, N.Y. I think if he reversed his list it would be all right.

Dr. J. H. Kennerly, St. Louis, Mo. I would like to say a word in connection with Dr. Dubeau's remarks. It is a very fortunate thing that this stomatologist in France decided he would write his criticism on American dentistry in his own language. Not many American dentists can read the French language, and consequently he has lost the effect his article would have had if he had published it in some American dental journal, when in all probability he would have turned loose a nest of hornets about his ears that would have buzzed for some time.

Dr. T. W. Brophy, Chicago That reminds me of a story told by Eugene Field. This is not strictly scientific, nor pertaining to dental education. He received a poem from some one, through the mail, for publication. The title of the poem was, "Why Do I Live?" It was all about the flowers that bloom in the spring, etc. Mr. Field promptly replied, "Because you sent your poem by mail." (Laughter.)

Dr. Otto E. Inglis, Philadelphia, Pa. When the student is received, he should have a certain amount of education, which this body is evidently on the point of settling definitely. Beyond that, after we have received the student, he should be put under pressure. From the day he arrives I believe he should be put in technic classes, and as soon as possible the other classes, on practical work. If he cannot measure up he should be dismissed, after he has been given a reasonable allowance of time. As to quizzing, I would like to say that I quiz on my own branch, devoting about one day a week to the branch. Occasionally I stop during the lecture hour and quiz. In addition to that I have gotten out upon my subject a list of questions covering the text-book, which I use. The idea I want to bring out is that by the use of a complete list of questions, which is designed to bring out the subject step by step, and with a page reference to the text-book after each question, the student can work the matter up by himself. He reads the question, and if he cannot answer it, he looks it up.

If any of you gentlemen would like to have a copy of the list, I shall be pleased to send it to you with my compliments. The idea of including manual training as a part of preliminary education is perhaps a little difficult, but possibly a new view might be taken of that, and manual training might be allowed to take the place of some of the counts. Instead of a man having 48 counts on general education, let him have, say, twelve for the manual training he may possess. If a man has followed a skilful trade, or has had some occupation that has made a man of him, let that be of use to him when he enters a dental college—not merely book education, but actual experience in life-work.

Dr. T. W. Brophy, Chicago

There is a block of wood in the city of Vienna which is made use of by the Institute of Technology there. This block of wood is filled with nails. It becomes the duty of every student who wants to become a graduate of that institute to drive a nail into that block of wood, so it does not bend or break or touch any other nail in the block. It is a lesson in technic. That block is on exhibition where everyone may see it. It is a pretty fair test of a man's skill in manipulating nails. If he fails to drive the nail in complete, without bending it or breaking it, or striking any other nail, he is not fit to take upon himself the duties of civil engineer or mechanical engineer, or whatever branch of engineering he has been studying.

Dr. C. M. Ford, New York

With regard to the length of the course, I maintain that we can use four years to advantage; but the question I intended to bring up was that the balance is not quite correct. I think all preliminaries should be completed before the student begins his dental course. When forty-eight counts are required and completed before the beginning of the dental course, then increase the number of preliminary counts and time of dental study proportionately. It was my intention that the technic should count as part of the forty-eight counts, possibly eight or twelve counts, and should be part of the last two years' preparatory work. We cannot graduate students until they are twenty-one years old, and if we have a three years' course, they complete their preliminaries at the age of eighteen. I think that a certain amount of practical technic instruction should be brought into the preliminary part of the student's education, as in other professions. Regarding consultations between demonstrators and professors: Within certain limits, the closer they can be brought together, the better the understanding that exists between the demonstrators and the professors, the better the work that will result. We have found it so. The demonstrators become more interested; they think they are of value if you give them your time and your opinion regarding the methods of teaching, and try to help their work along. A written review is of untold value. I never tell the students when they are going to have a written review and they are not prepared for it, so that I find out what they really know. In quizzing, I have no time to call men and bring them down to the front seat. Take a small class so that you know every man. You can skip from one part of the room to another as you ask your questions, and the student never knows when he will be called. If I suspect that a student is telling I stop and speak to him or excuse him from the room. This is effective, and I have little trouble. The quizzing is one of the essential means of instruction. It is driving home the nail, and the fact you have driven home is the fact that will stay with the student.

How Chemistry Should be Taught.

By Dr. D. R. Stubblefield, Nashville, Tenn.

This brief contribution must not be considered an effort to discuss the technic of chemistry from any standpoint. Imperfect as chemistry may be admitted to be, still it is too perfect, in another sense, and too much has been added to the sum of human knowledge by its researches, for us to complain of its incompleteness here. Our personal knowledge, while very limited, is still full enough to say, without fear of successful contradiction, that beyond doubt the age owes much to chemistry.

This discussion, in keeping with the general scheme of the programme, shall be confined to some personal views from the standpoint of one who has taught some and thought more upon the problem, as stated above. We have observed that this branch has too often seemed a bugbear to students. This is not as it should be, but it is, nevertheless, a fact. In our opinion the cause of the evident opposition of mind is due to some mistake in method of teaching, or in aim of policy in the course, or in the teacher himself, perchance. There is too much value in the subject for us to throw it out, and as there has been no consensus of opinion as to what the exact fault is, it remains for us to remove the fault or suggest a change of method or policy. As it seems to us, we should take our choice between the two horns: Teach more, or confessedly attempt less.

If we were in an ideal world nothing less than ideal perfection would satisfy us. We could then confidently set our plans to accomplish ideally thorough results. Then we should have ideal students whose minds and wills were in perfect accord with the highest conceptions of conscientious instructors. Then we should have courses long enough to painstakingly teach every branch of knowledge that enters into an ideal preparation for dentistry, and each graduate would go out thoroughly equipped with knowledge, into life. In such a course, as there are no subdivisions of chemistry, except by courtesy, we should have the most thorough course as the only course in that science.

But such a picture is only an idle dream. We do not have ideal students, in mental powers, or in maturity of mind and body, or in industry, or in previous educational preparation, or in natural fitness for the practice of dentistry as an art. Therefore, we must not dream, but must accept things mostly as we find them, and make the most of our opportunity, as it is.

Under these circumstances, our suggestion is that we formulate a course which would give a grasp upon the rudiments of chemistry, with no pretence of making thorough chemists of our students. It should be called a course on "chemical philosophy," as it really would be. It should comprise all those fundamental facts of a practical nature derivable from that source. It would fit a student to be an intelligent, appreciative learner of more chemistry should he desire to do so, or should he find the demand for more specific knowledge in that line imperative in his after-life; or it would fit him to be a more intellectual listener to statements and articles that were not too technical in phraseology. There would be no sham about it. His mind would be clear about it, for he would know he was no chemist, and he would not be tempted to pretend to be. Definiteness of mind is education, after all. Our profession has abounded too long in pretence, sham, vagueness and uncertainty of mind. We ought to know, or know that we do not know, and have done with it. We have too long occupied about the same attitude of mind toward education that most of us do toward digestion. We think that if we can only swallow anything, by some means or other, it will be digested. Instruction, like aliments, must be assimilated to bring good results. Indigesta, whether alimentary or mental, are in the way, if not actually harmful to the organism, though by reason of strength the effect may be minimized. Indeed, we believe that mental dyspepsia, in a thousand forms and degrees, has been the cause of the marvellously diverse conclusions that have emanated from the profession. A discussion of this idea, however, is another story, as Kipling would say, and we shall not go into it here.

Our suggestion is that the instruction on chemistry be limited to a course on "chemical philosophy," which the students could thoroughly master because of its simplicity and limited scope. It should be true and vital as far as it went, giving a definite grasp upon definite facts.

Some of you may, and doubtless do, refuse to accept such a compromise. We do not wish to thrust anything down your throats, but hope that in your agitation you will be able to *think out a better remedy.* We predict that those who refuse to accept the compromise will be those who have an extended knowledge of chemistry; but the majority of those who hear this will be conscious that they already occupy practically the compromise, for they know that they know only so much chemistry as enables them to understand merely "something about it." It is "up to" this better informed contingent to show that they are actually better practitioners than the rest, and then to show that this superiority is unquestionably due to their wider and better knowledge of chemistry. If they do this to our satisfaction, or even to their own satisfaction, then it must be admitted that our suggestion should be thrown out without further ceremony; otherwise, candidly bring it under your serious consideration.

Discussion.

Dr. A. W. Harlan, New York

If you teach chemistry, you ought to teach enough so that the student can analyze saliva and the urine, and know something about organic chemistry. We are just on the threshold of having something of an understanding of organic chemistry, and you will notice that one of the Nobel prizes bestowed by the King of Denmark was conferred the other day on Professor Von Beyer, for his investigations in organic chemistry. That award amounts to $40,000. There are $200,000 every five years divided among five men who have made the greatest discoveries or done the best scientific work or the most humanitarian work in the world, and so that department of chemistry has received recognition. I think the dental colleges of this and every other country ought to equip their students with a sufficient knowledge of inorganic as well as organic chemistry. No one is more cognizant of his deficiencies in that line than I am. I studied under Professor Cassidy and at that time chemistry and materia medica and dental therapeutics were all joined together. I think that is all wrong, and I think there is sufficient in organic chemistry and inorganic chemistry to keep a teacher and demonstrators for at least a portion of the two and three years' course, anyhow. Even now, with all the experiments that have been made, they do not know the exact composition of albumen, and they cannot write the formula to-day; and still some of our pseudo-chemists pretend to tell us what to do about all of the albuminous and decomposed contents of a root canal where a pulp once existed. If they have not the beginning of the formula, it is about time we ought to have our teachers informed enough to give the A B C of it, anyhow. I read a paper in Washington, the other day, on the ultimate effects of decomposition of animal tissue, and I had to confess before that audience that even Von Beyer and Holleman, who are two of the best chemists living, have not been able to tell us what we want to know on that subject. We talk about the end products of things, without knowing what they are. A man said that the end organ of a socket of a tooth was the alveolar process. That man does not understand the first thing about it. In embryology we know some things pretty well—as far back as 1839 when Goodsir made his first observation, something about the method of development of a tooth. I am not teaching at present, but if I do so again, the particular thing that relates to organic decompositions, etc., in connection with therapeutics, is the one thing that will engage my serious attention.

Dr. F. D. Weisse, New York

I am very glad to have had the opportunity of hearing this paper. At the same time I am a little disappointed. The question of teaching chemistry to dental students, I have thought of a great deal, although not engaged in teaching that department. It has seemed to me that the education usually given is not sufficiently directed to the needs of the dental surgeon. The course, as usually pursued by the professor of chemistry, covers the general principles of chemistry, followed by considerable time devoted to the non-metallic elements and their compounds, and then the course is closed with the consideration of the metals. He is too apt to find himself quite crowded in order to get in all he wants to say about the latter because he has given so much time to the principles of chemistry and the non-metallic elements and their compounds. I have often asked the question, in regard to the lectures on and the laboratory course in chemistry, why more attention could not be given to the chemistry of the materials actually used by the dental surgeon in his practice. Prosthetic dentistry is a broad chemical field, and if the chemistry of every material that is used were dealt with, from plaster on, the knowledge would be most useful. When a man has a knowledge of botany he can walk through the fields and recognize and place this, that or the other tree or plant; so the educated dental surgeon, in his office and in his laboratory should, to my mind, know the chemistry of everything in sight and that he handles. Some gentleman said to-day, "That when a student enters one of our institutions immediately a pressure is applied to him, in that he is called upon to do more than he can do." Give a student the opportunities of getting hold of the practical side of the subjects of the curriculum and he will never realize that any undue pressure is made upon him. If you teach a student the chemistry of this and that material that he uses he will realize what chemistry is for and he will be interested; but if he is called upon to listen at length to the principles of chemistry, the professor will be too often talking over the heads of his audience.

Delancy W. Ward,
New York

Chemistry has changed a great deal in the last few years, and not so long ago it was hardly considered an exact science, but it certainly belongs to that class at the present day. In regard to the teaching of chemistry much might be said, but the matter will be considered in a paper at another time. Chemical philosophy, which has been mentioned, is very important and should be taught with the elements. This matter is well handled in Dr. Holleman's text-book of inorganic chemistry. He is Professor of Chemistry in the University of Groningen, Netherlands. His method is to consider some of the non-metallic elements first, and with each element or two, to introduce a law or principle, so that the student learns fact and theory together. The substance, albumen, has been mentioned in the discussion, and I should like to say a word as to the reason why its formula is unknown. Chemists have not been idle, but this substance is one of the most difficult to study, and it is impossible to give it a formula because its molecular composition is unknown, and at present there is not a method by which its molecular weight can be determined. Several years ago two methods were discovered for determining molecular weights, known as the "freezing point" and "boiling point" methods, and since that time the formulæ of many compounds have been obtained, but these methods are not applicable to albumins. As to organic chemistry, now called the chemistry of the carbon compounds, there is an article in the November *Cosmos* which illustrates the value of this subject to the dentist. It is the treatment of a decomposing pulp with a mixture of formaldehyde and tricresol. The pulp, it is stated, can be treated with this mixture and the cavity sealed up, and that gases ordinarily given off in pulp decomposition, as ammonia and hydrogen sulphide, combine with the formaldehyde and form solid compounds. This is only one illustration of the value of chemistry in dental surgery.

Dr. D. R. Stubblefield,
Nashville, Tenn.

I wish to assure Dr. Weisse that he is not the only one disappointed. I also am disappointed. I hardly know how to discuss the discussion, because I purposely left my paper a large interrogation point—if it was not an exclamation point. I hoped it would rouse a little more mental agitation than it has, and that is the reason why I wrote it as I did. I do not know much about chemistry, but for seventeen years I tried to make others believe I knew something about it. (Laughter.) I know, however, that whenever an article on chemistry has been presented to even the best representatives of our profession, they have sat paralyzed, or at least unable to state what they thought—hypnotized, as somebody says. We must confess that we must either teach less—just lay it aside—or teach more. These are two horns of the dilemma. I have been connected with teaching for twenty-six years, and I have developed a full-grown conviction that chemistry is one of the things we know so little about that it is from that or some other reason that we have not given it enough time. This "little learning has been a dangerous thing." "Drinking lightly intoxicates the brain; but drinking deeply will sober us again." Along this line, we must make some confessions. I was glad Dr. Harlan was here and spoke on the question. I am sorry he has gone again. He has had more than the average acquaintance with chemistry. The world to-day is demanding definite knowledge and practical knowledge from the field of organic chemistry, and we are humiliated because we cannot give it. Organic chemistry represents results; it represents the finished product, so to speak; but you must have a foundation under every structure, and chemistry is one of those subjects that is too big to have us consider in a short time and hope to assimilate and grow strong from living upon it. We ought to wake up to that fact. Most of us know just enough chemistry to feel we have had our little share, and know as much as another. It is poor consolation to say, "I don't know anything; but neither does anybody else." How many men can discuss chemistry? How many can feel at home even with its simplest statements? I do not know. I prepare young men to go up against our State Boards, and at least live through the fire of their questions, and some of their questions are about things that have never been seen on sea or land. Chemistry is a man's life work, and professional chemists abound everywhere. Dr. Weisse asked what could be done. He says tell them what plaster is. Sulphate of calcium. What is a sulphate? It is a substitution of the acid radical in the sulphuric formula by a metal, and we get a calcium sulphate, and we begin to know it. He is right. He wants the chemistry taught of all the materials with which the dentist may deal. We cannot jump into the middle of things; it is only after years of working with these non-metallic elements and the metallic elements, and other reactions and combinations that flow out of them, that we can get a student into a frame of mind where he becomes conscious of even the simplest products. I read that article of Dr. Buckley in the *Cosmos*, mentioned by Dr. Ward. I want to know how many people in the United States can read Dr. Buckley's article and come out better for having read it. I deplore the fact that we cannot make chemists, because in a sense a thorough chemist would be an excellent product, everything else being equal, in the way of making a dentist; but let me ask you what field of life, what department of human life, this might not be said about? The chemistry of every-day life is all about you. How many of you know that your bread rises by the development of a gas, and that the tough, doughy substance is held suspended by the drying effect of the heat? Everything about us is chemical. All the decompositions that offend us or please us are the direct results of chemical action, and it is a glad thing for any man to know some or all. I have wished that every dentist knew enough chemistry to understand the experiments of Dr. Buckley. He produces a beautiful article laboriously, as clear as a sunbeam, as he thinks. A great many men read enough of it to find out what the paper is about, and then it is put aside. How disappointing it is to feel you have labored in vain. As

I say, when I thought I was making a point so clear that a wayfaring man, though he were a fool, may not err therein, wide-open eyes had not seen and wide-open ears had not heard, because I could not get a man to digest it, and if you do not digest it, it does you no good. If you do not digest, you must get rid of it, one way or the other. As I said, I am disappointed. I wanted to raise a row. I laid the trap, but you did not go into it. I care nothing about method. As long as two people live in the world there will be two methods, if not more. The object aimed at may be achieved by various methods, and no man can question that who has thought anything about it. This principle in the paper of presenting just enough to put your mind into agitation, is a good one, I believe, because it will result in something being born. To sit still and not think is the unhappiest condition of any man. To stir yourself, to get a hustle on, as they say, that is the American idea. Whenever you agitate mind or body, you begin at least to get results, good or bad, and if we cannot write articles that will arouse us to think, then we are failures. Now to the discussion, if I may be accorded just a question, how should chemistry be taught? There is no dental chemistry or medical chemistry, no subdivision. It is just chemistry. It is so big that you have to take it apart and go from foundation to roof. I believe our courses are too short, the opportunities too limited under the circumstances, to hope to achieve it, and in all seriousness I offer a compromise that, while it does not cover and may not cover, and it may be amended probably, it gives us a suggestion that we can at least quit pretending to be what we are not. All of us as teachers know that the best product that we turn out is the man who can give evidence of what is in him. What is a practitioner? A doer. The word means it. To reach a point in chemistry where you can do with chemistry means a digestion of the facts of the fundamental science in it to such a point that time does not permit of in our present sessions. At present we will take a course of chemical philosophy which enables any intelligent man to build further. If he cares to, if he desires to be a Buckley or a Harlan, in certain phases of organic chemistry, he must continue to build to complete his education in that field. If we propose to get results that are worth while, we must face the subject intelligently, and go to work and build up to the desired end. We cannot do that from the nature of the case, and there are many things we cannot inject into our courses. To my mind, the course is staggering and ready to fall, because so many things have been injected into it already. In conclusion, we must teach more chemistry, or we must confessedly teach less, in my opinion, and "if that be treason, make the most of it."

Symposium on Infirmary Teaching.

(THREE PAPERS)

1.—Preliminaries.

BY DR. J. H. KENNERLY, ST. LOUIS, MO.

I am not going to detain you more than a few minutes on the subject of preliminaries. There may be many, but there are some of such vital importance that to my mind they overshadow the others. In the introduction of freshman students, either into the laboratory or infirmary the first and most important preliminary that should be called to the attention of the student by the demonstrator in charge of the class in cleanliness. If you will walk into the laboratories of a great many dental colleges you will see that they are in anything but a clean condition. My idea is that habits formed as students are liable to follow a man through his entire professional career. If you go through a laboratory you will find one, two or half a dozen students who have everything as neat as a pin about them. It is a pleasure to work around such men. They have been taught to keep themselves and their surroundings clean, and consequently it is hereditary with them; while, on the other hand, the great majority are more or less careless, and the condition of the laboratory is such as no one likes to see. The demonstrator is careless; he lets things go by, and the habit becomes set. The head of the department comes in and says, "Here, what does all this mean?" We should begin right at the beginning and whenever a demonstrator is careless his attention should be called to it in such a way that he will not forget it. If he will not keep things in order, get rid of him and get some one who will. When you can walk through a laboratory and see that everything is nice and clean, it makes an impression on the mind of the teacher and on the mind of the student, and the impression will remain with the student as long as he lives. Take the student from the laboratory to the infirmary. With us we have a special room. It is my privilege to devote all my time to the department of the institution I represent. I have two operating chairs and two engines, and I take four, six or eight men into that room. I ask one man to take a seat in the chair; the others stand around. I tell them I am going to try to instruct them in the proper management or handling of patients, previous to their going into the infirmary. (I pay no attention to this work until after the holidays.) I ask them if they can tell me what is the most important thing to begin with, and the usual answer is they do not know. I tell them the first thing is cleanliness. Wash your hands before you touch your patient; then seat your patient in the chair; manipulate your chair so your patient is comfortable. Patients are not all the same size, consequently the same arrangement of the dental chair does not suit every patient. After you have seated your patient, so you think they are comfortable just go back and wash your hands, so you are sure they are clean. Take a mirror and exploring instrument, and make a thorough examination of the mouth. I have examination slips, and in making this examination I turn to my pad and mark the tooth that is to be filled. I also put down the initial of the material that should be used. I tell them that it is just as necessary in filling teeth to have clean teeth to work on as it is to have clean hands to work with; consequently the first thing I introduce to them after the mouth mirror and exploring instrument, is the instruments I use for cleaning teeth—scalers, chisels and instruments of that kind. Doubtless in the discussion of this symposium, different classes of instruments may come up; but what you or I use is immaterial, and it is unnecessary to go into detail. One man can get better results with one set of instruments than another. I select a student from those present whose teeth need cleaning and I clean his teeth myself, to the best of my ability, and I hope when it is done it would pass inspection before this body. I find that the student does not comprehend for some time after beginning the use of an instrument, how he should handle it. They take hold of a scaler at the end of the handle, and stand off and pull. I have frequently stepped away and asked one of the students to take my place. I clean one tooth as thoroughly as I can, and then say, "Mr. Jones, now you take this patient and clean the next tooth." He will stand there, and pull. We have fingers to hold the instruments, but it does not require all the fingers to do so. You have others that can be rested against the teeth, that give you equal force, and at the same time prevent wounding the tissues. After a thorough cleansing of the teeth, I take a piece of rubber dam, and I say, "Now, we will apply this to the anterior part of the mouth. We are going to fill an incisor." I believe in the application of the rubber dam we should have all the light that we can get. In applying the dam for the filling of a central incisor, I invariably take in the six anterior teeth. It gives light and keeps the rubber dam out of the way, and facilitates the operation in such a way that you cannot get if you only put it on two teeth. Then I say apply it to a molar; I apply it so I can get all the light possible. One great mistake many students make in the application of the rubber dam is that they think it is only necessary to isolate a single tooth in order to fill that tooth. We get none too much light at any time in the mouth, and putting the rubber dam over three or four teeth will give you more light and prevent the probability of tearing the dam. I also give them a short talk on the separation of teeth, and the methods I may advocate for such purpose. The cause is the principal point I am after, the cause for separation, that we may restore the approximal surface, bring the teeth to as near their natural forms as possible, so the food will not pack or wedge between those teeth and thereby cause decay in the adjoining teeth. If we can knuckle our fillings or build them in such a way that when they return to their position we find the natural form of the tooth has been restored, the comfort to the patient is beyond comparison. Then I go a little further than that in these little clinical talks. I go on to the treatment of teeth, and the reason for the treatment, the diagnosis of dead teeth. You frequently find a tooth coming to you which causes considerable pain. The experienced man understands the trouble, but the student does not. In his operative technic we teach the anatomy of the tooth as far as possible, and yet when he begins to prepare the cavity he is at a loss to know just how far he shall cut. I try to illustrate by cavities that I may find in the mouths of students just how near the pulp is to the base of the cavity, and how far a man may go in the preparation of a cavity before he comes in contact with the pulp. It is a good thing to have a blackboard right by your chair. You can make any illustration you want. By taking the students through this course, you will find when they come into the operating room in the junior year they will have much better success, and people will not realize that they have not had some practice previous to the time they were turned loose on the patient. That is my idea of the preliminary treatment before assigning a student to work in the infirmary.

2.—Operations.

BY DR. OTTO INGLIS, D.D.S., PHILADELPHIA.

During the freshman year at the Philadelphia Dental College technic courses are given aiming to teach the principle involved in prosthetic dentistry and to give simply an idea of practical dental anatomy, cavity preparation and the use of tin foil and plastics. During the junior year prosthetic technics are made to include a metal plate with vulcanite attachment and the soldered depositing plate. Dentures for the mouths of patients are constructed of vulcanite, of aluminum and vulcanite, and of metal alone if required and indicated. Crown and bridge technics are introduced.

For the operative part four typical cavities involving the main principles of gold filling are prepared and filled with gold. Three cavities exhibiting the principle of preparation for plastic work are filled with various sorts of plastics, simple or in combination, and both with and without a matrix, the Clapp and Herbst matrices being demonstrated because of their universal utility and simplicity. In another class the use of canal instruments and dressings and of canal fillings, of capping and dentalizing materials are technically shown. In a separate class the use of rubber dam, clamps, separators, wedges, napkins, and cottonoid rolls is practiced upon fellow-students. Besides this each junior is required to insert five gold and ten plastic fillings in the mouths of patients. In the senior year the student is required to make a variety of orthodontic devices and attend a technic course in porcelain work. Besides this he must satisfactorily insert for patients thirty gold, twenty amalgam, three porcelain, three gutta-percha, three zinc phosphate, two amalgam and cement combination, and two gold and amalgam combination fillings. He must also treat two cases of gingivitis, two of apical abscess, with and without fistula, one case of hyperemia of the pulp, one of pulpitis, one of pyorrhea alveolaris, treat and fill ten root canal cases, also cleanse properly ten sets of teeth. He is required to wear a clean white coat, disinfect his instruments and conduct himself well. If a college patient is assigned a marked diagram of the mouth is made by the superintendent of clinic or an assistant. This is handed to the lady stock-clerk, who at once makes out an infirmary card upon which is a duplicate diagram printed at the top. Both are given the current infirmary number and the original is filed. The infirmary card is ruled longitudinally into columns of unequal size for entrance of records. These columns are named from left to right: Number of filling, 1, 2, 3, etc.; number of tooth (each tooth on the diagram is given a number, 1 to 32, inclusive); location; kind of filling; material; filling stages (first, second, third); style; grade; demonstrator's initial for final signature; date. If a student has a patient recommended to him he is allowed to make out his own original diagram while examining the mouth. This he turns in to the stock-clerk, receiving an infirmary card therefor. Each filling operation or treatment must be shown to the demonstrator at an incomplete stage and then when completed or partially so. For gold, stage 1 means the unprepared cavity; stage 2 the prepared cavity; stage 3 the act of packing the gold. At each stage a demonstrator signs his initials. When the filling is completed a demonstrator signs for it and gives the date, or refuses to sign. Later the professor in charge sees a certain number of these fillings and marks them "for graduation." Should by chance a demonstrator not be present when the polishing is completed the previous signatures identify the maker of the filling. As material is bought from the stock-clerk she stamps the number of rolls purchased in the "material" column. This record prevents fraud upon the institution, and the infirmary practice of the student is assured. The student has temporary charge of this card, but is urged for his own credit to turn it in to the stock-clerk, who takes it to the general office, where each day's work is entered in a general way in a record under each student's name. The cards are then taken to the stock-room, where the clerk enters in another book under separate headings or classifications the character of each filling and the grade credited to it. Thus the headings, "Gold compound seen and signed for by the professor in charge for graduation," "Gold compound not so signed but graded by demonstrators," indicate the character of the analysis. C—J indicates that Dr. Jones graded such a filling with a value indicated by C. By the aid of this book, which is open to inspection by the student (at the stock-room only), both the professor in charge and the student are informed as to his standing upon the infirmary record. After such entry the item is checked off to prevent re-entry, and the card is filed in a rack under the student's name. From this rack he may obtain it at any time. If any question arises as to the correctness of the official records the student has the right to collect his cards and demand correction of errors. This method of record keeping is extremely simple and satisfactory, and gives complete control of the student. If a card indicates that work has not been completed in due time a letter of inquiry is sent to the patient, and this in itself benefits the clinic and keeps a check upon the students. The operations themselves, of course, vary according to circumstances. The endeavor is to do as much gold work as possible upon approved principles in view of development of manipulative skill. The instruments are carefully selected for all-round work and their purchase required.

The demonstrators, of course, advise, assist, criticize, etc., according to their judgment, and the professor in charge requires a sufficient number of the best fillings to be shown him at various times, and is thus enabled to judge of the progress and proficiency of the student. A similar card system is used for the crown and bridge work, the prosthetic work and the porcelain inlay work each being in charge of and under the special supervision of the professor or demonstrator in that branch. The color of the card is different for each style of work in order to prevent confusion.

Dr. Kennerly has indicated the manner of handling a limited number of students, but in an infirmary where fifty, sixty, or seventy students are operating at all times, it is only possible to superintend and take up each piece of work in part. That is supplementary to the technical work. I believe students should be fairly well grounded in all technical work before they are admitted to the infirmary at all. I brought with me some of the record cards which we use to show you our manner of keeping a record of work done.

3.—Conduct of Students.

By A. E. Webster, L.D.S., D.D.S., M.D., Toronto.

My paper following Dr. Inglis', I am afraid, will not seem connected. My idea was that the first paper would relate to the seating of the patient properly in the chair preparatory to the operation, etc., and that the second would illustrate to us how he would teach that student at the chair to perform certain operations. My paper would take up the relation the student bears to that patient after the operation is begun.

This title means the relation the student bears to his patient after an operation has begun. There are so many things outside of the technical operations that the student should know and be taught, both by example and by precept, that it is difficult to present the subject in due proportion.

There are three attitudes which students often bear towards their patients, all of which are decidedly improper. He is often so solicitous of the patient's comfort and the good opinion the patient may have of him that he cannot do efficient work. It isn't long until such a student becomes the mere servant of his patient, doing his bidding, whether right or wrong. A student may get into the habit of acting as the patient boss, commanding, and altogether treating the patient as if he had no rights at all. The worst attitude of all is to look upon the patient as legitimate material to be used for his instruction, caring not for what ought to be done, but for what suits his convenience. The student excuses himself, perhaps, by saying that, "It doesn't make any difference how such a patient is treated. They don't know any better anyway." Such a position is dishonest, it shows the character of the man, and it matters little whether the patient is of the infirmary or of private practice, his heart is in the same place, that of dishonesty. Such students go out and treat every patient as legitimate prey upon whom to work their dishonest schemes. This dishonesty of purpose in one form or another often pervades a whole infirmary. One or two such students relating their experiences in doing clever things in dentistry, or how they got even with a certain patient, is enough to poison a whole class.

The student must be taught to approach his patient with an absolute honesty of purpose and have courage and self-confidence enough to carry out that purpose. At the same time he must show that he has his patient's comfort and welfare at heart, which will gain his confidence. The student who has brains enough to be a dentist, and is honest, needs only to understand the reasons for acting in certain ways towards his patient to carry them out. He will not continue to operate with unclean hands or unclean instruments if he knows why they should be clean. Given an honest student and honest demonstrators, and all the conveniences in the infirmary that should be in an up-to-date dental office, there is no reason why an honest dentist of neat habits cannot be turned out. The demonstrators have a great responsibility upon them; a hint, a look, a word, may change a student's attitude towards his patient from one of honesty to one of deception. For example, a student breaks a broach in a root canal and gets the suggestion from the demonstrators not to tell the patient. There are many good reasons why the patient should know what is done for him and accidents may happen, not necessarily enlarging upon them, but to let him know his own responsibility and the risks he takes even with a careful operator.

Demonstrators who give such suggestions are doing a double wrong: one towards the patient and a greater one towards the student. We often get this suggestion from a student: "I have not time to put in a gold filling to-day, so I suppose an amalgam will do." Such suggestions are not honest, and should be used as a text for a few carefully chosen remarks; he must be shown that his convenience, or the patient's ignorance or lack of appreciation, must not interfere with his duty, or the indications for a certain operation.

As far as possible the operator's fingers should not be allowed to become moist with the patient's saliva, but in case it should occur there ought to be towels or doylies at each chair to keep both hands and instruments clean while operating. There should be suitable receptacles at each chair for soiled dressing and waste cotton, so there may be no temptation to throw these on the floor. Arm rests, hand rests, and finger rests while operating can be best taught by demonstrations, and by correcting faulty habits as they occur. All of us have seen students with one hand on the back of patient's head and hammering the gold through with the other; such habits must be corrected at the time. The patient's face or clothing must not be soiled or the hair disarranged. Demonstrations should be given to help the student to avoid such occurrences. Students must be impressed with the fact that they should operate with the fingers, and not loll over their patients and press upon them. I know of no way of teaching these things except by example and correction when they occur. Every demonstrator should feel it his duty to correct every faulty habit in the student, whether it is dirty hands, soiled linen, faulty position, untidy table, or badly arranged operating case. Demonstrators often think they have fulfilled their whole duty if they go from chair to chair giving instructions in technic, instead of feeling the responsibility of teaching the practice of dentistry, which is a vastly different thing from teaching technic.

Instruments require a great deal of attention and care. They must be kept clean and sharp and in good order. As they are returned to the table they should be wiped off and placed so the points will be in full view. There should never be a miscellaneous heap of instruments on the table at the same time. As far as possible excavators, burs and chisels should be on separate places on the table, and as soon as the insertion of the filling is begun the table should be cleared of cutting instruments and the pluggers brought out. When the operation is completed they should then be sterilized and returned to the case in proper order, so that if the student were asked for an instrument he could find it in the dark.

The sterilization of instruments in a college infirmary is a problem hard to solve. Steam sterilizers, dry sand sterilizers, boiling water, and vapor sterilizers are impracticable. We have lately installed a twenty-gallon tank in the bacteriological laboratory immediately over the infirmary with a pipe leading to a convenient spot in the infirmary with a concealed tap. After a good deal of experimenting we have decided to use as a disinfecting solution a 5 per cent. solution of formaldehyde in water, saturated with borax and colored to avoid accidents. This solution will disinfect operating instruments in less than five minutes, without in any way affecting the temper or polish of the finest points. The student is expected to partly fill a glass with the solution and place his instruments into it before cleaning them up to put in his case, or occasionally dipping them in while operating. We are also putting in a shutter in a large ventilating air-shaft which opens into the infirmary, which will hinder formaldehyde gas from escaping. In the lower portion of the shaft may be put ten or twelve students' operating cases. Formaline will be vaporized into the shaft for some hours. We have found that cases so treated are sterile throughout. Then if the whole case is sterilized once a week and no infected instruments are returned to it, there is some hope that infections will not be transmitted, and that the student will have had a useful lesson in sterilization.

It is necessary to demonstrate to students how to remove the rubber dam deftly and not trail its wet surfaces over the face, or leave a wet skin exposed to the air. All holders and ligatures should be loosened and the rubber removed quickly outward and to one side, and followed with a dry towel to remove any moisture about the mouth. A glass of clean water should be given to the patient to rinse his mouth. This, with some pleasant remarks about an interesting subject, and a re-examination of the operation, together with an assurance that he is all right, should complete the sitting, except for laying out the next sitting's operation.

It is no small task for a student to get his first patient out of the chair. The towel must be removed, the chair lowered gently and turned to one side, so that the patient may step out freely. Now comes a trying moment for the novice, to so engage his patient's attention that he will not think of his former discomforts, and send him away with satisfaction and his thoughts on something else. To do this while making another appointment, and not to lose a good deal of time, is a task for the reader of character and the tactician. In general, appointments should be made to the patient's convenience, but at the same time the patient must be given to understand that he must return if necessary whenever required. Appointments must not be made at any old time to suit the trivial convenience of the patient, lest he think the dentist a servant whose opinions as to when an operation should be performed are of no consequence, or as if his time were of no value. Better make the patient feel that he is lucky to have such a student operate on him.

Students in some colleges collect the fees charged for the operations and deliver them to the office. The amount of this fee often becomes the basis of his charges when he graduates, thus getting an improper estimate of his services. To avoid this we have a professional fee marked on the slip which the student retains, and the patient pays for his own operations at the office. All our charges in the college infirmary are made on the basis of the services rendered, and not on the basis of the amount or kind of material used. In this way we hope to eradicate the idea so well grounded in the college infirmary, that we have something to sell and the patient is the customer. We do not sell materials to our patients, but we do collect fees for our services.

Under no circumstances should a student be allowed to examine a patient's mouth except in the operating chair. I have seen a student just before he said good-bye to a good-looking patient at the outside door, ask her to let him examine her teeth to satisfy himself of something he should have examined before she left the chair. To say the least, such things are indelicate, and if permitted in the college will lead the young graduate into an improper attitude towards his patients.

Students are sometimes offered tips from patients, which reminds one very much of accepting alms from the patients of a free hospital to give a dinner to the poor. The patient who can afford to give tips should not be looking for charity at a college clinic. The student who accepts tips places himself in a position of a poorly paid servant, and has no place in a dignified profession.

It is often a difficult problem for the management of an infirmary to keep the student at work even after he has adjusted the rubber dam. There are so many distractions about an infirmary. All the social, sporting and business connections a student may have must be attended to while he is supposed to be operating. Then there are special clinics, unusual cases to be seen, demonstrations to be seen, a new patient to be interviewed, or an old one to be spoken to about former operations, the instrument dealer must be seen frequently to get new instruments, demonstrators looked up, and materials gotten from the office. Now, add to all these distractions a student who places no value on his own time and cares little or nothing about either the time or comforts of others, but having an inborn laziness, and there is not much time for work. Some students who are really not lazy may be about the infirmary all term and appear to be busy, and when spring comes they are away behind with their work, all because of a want of organization in their work. To correct such habits there should be a few good sound lectures given on the organization of work and how to avoid wasting time. The study of the diary of a busy man is a great help to the young. First, the student must be helped to appreciate the value of his own time. There are several ways of bringing this home to him. One suggestion is to point out to him the number of years he has to spend in preparing to make his own living and to support those who are depending on him, and the few years left to do all this. If he can be made to appreciate the value of his own time he is more likely to appreciate the value of others', and will not keep his patients waiting for hours to suit his own convenience. If he is educated to have a thought for others' time and comforts he will not leave the rubber dam adjusted while he goes downstairs to have a smoke. Students should be educated in matters of social economy and division of labor, not merely told what is right or wrong, but the basal reason given.

In this same connection comes the talkative operator. Some students spend more time talking to their patient than it would take to do the operation. Others never talk, but cut and split and grind as if they were on a piece of marble. To entertain a patient so his mind is never on the operation and lose no time, is one of the arts of the successful dentist. There are so many elements which enter into how to do this, that it can hardly be taught at the chair except by demonstrating points now and again, *e.g.*, a patient is whimpering, restless and antagonistic to the operator; a demonstrator comes along and in a firm voice says, " Sit quiet," and does what is required without any objection from the patient. Or a patient may be crying and frightened. The demonstrator, in a few sympathetic words, gets full permission to do whatever operations may be necessary. To give all the reasons for the different treatment in these two cases would take too much of the demonstrator's time, but he must be prepared to make demonstrations and give hints as to how to do it. The broad education required to manage people under discomfort can only be attained after study and careful observation of human impulses.

After listening to these three papers there should be a better appreciation of the importance of the position of a demonstrator. It is his duty to teach the practice of dentistry in all its phases and be more or less an expert in all of them. On every count it is much more important for the student to get expert teaching while he is forming habits than it is for the graduate whose habits are formed and judgment educated. It takes greater tact, skill and versatility to be a demonstrator than to be a lecturer.

In closing, gentlemen, this subject, which seemed so small at first, has expanded into one discussing the largest elements of success or failure in the practice of dentistry. To teach a student how to manage himself and his patient, from the beginning of the operation until the patient is out of the office, is a problem too large to be undertaken in this paper, or for a demonstrator in the infirmary, unless assisted by lectures.

Discussion.

Dr. A. G. Friedrichs, New Orleans, La. In listening to Dr. Kennerly, there is one source of infection which is a most active one, and that is in regard to the mouth mirror. It has been a habit among many practitioners to transfer that mirror from mouth to mouth without any precaution. It is done in the infirmary without sterilization.

Dr. J. H. Kennerly, St. Louis, Mo. It is not done in our infirmary.

Dr. A. G. Friedrichs, New Orleans, La. Well, you did not mention that.

Dr. J. H. Kennerly, St. Louis, Mo. If I left out anything of that kind, I meant to make the point that everything should be clean and sterilized.

Dr. A. G. Friedrichs, New Orleans, La. We always keep a sterilized solution in which all instruments are dipped.

Dr. A. E. Webster, Toronto, Canada. What do you use?

Dr. A. G. Friedrichs, New Orleans, La. Bichloride of mercury.

Dr. Louis P. Hall, Ann Arbor, Mich. Dr. Kennerly spoke of placing the rubber dam. We have a small amphitheatre, something on the plan Dr. Weisse showed us the other evening, but our seats are more in a horse-shoe arrangement, and we have three rows very close together, so we can put a chair into that opening, and have three rows of students very close to us. My method has been to talk for half an hour just before the infirmary is open, and demonstrate to them the placing of the rubber dam, clamps, etc., continuing this from time to time, and bringing up little points that I see the students have been careless in the day before or during the week. As we cannot speak to each student we keep a list of those things and speak to a larger number of them together, so they all get the benefit of it. I ask my assistants to make notes of any points they desire the students' attention called to. During these talks I encourage the students to ask questions. In demonstrating the placing of the rubber dam, I usually take one of the students, preferably one whose teeth are so shaped that you can easily slip on the dam, so your time is not taken up by working the rubber in between difficult and close places. I then go through the same preparation that Dr. Kennerly does, the washing of the hands and having the napkins and towels, etc., in plenty. I have two rubber dams, one for the patient who sits in the chair. I will ask that same young man to hold in his hand a skull with the upper and lower maxillaries attached. The class can see all the parts of the mouth. I place the rubber dam on and show them how I hold it there, and carry my finger back to get the distance for the most distal tooth I wish to cover, and possibly I will put it on this young man's mouth. Before that I put it on the skull, covering the upper or lower teeth as seems best. In that way they can see how you place your clamp without grasping a large amount of the gum. I show them how to open the clamp just wide enough to go over the tooth and how to hold it best. They can see on the skull the adaptation of the various clamps to the teeth on which you use them. Then you show them how the rubber is rolled around your clamp forceps, or if you use an ivory clamp, so you can look through it. Have everything nice and clean, and you can demonstrate very easily the placing of these things. I was particularly pleased with Dr.

Webster's paper. One point especially, in respect to the student and the patient, when he has a patient in the chair, he gets interested, and you will find the rubber dam has slipped so he is peeking through a narrow slit and trying to do his work. You can quietly readjust that, or say, "Young man, get a good clear space here where you are working; never mind the other side; have the side clear where you are working." Then readjust the dam showing how you do it. Sometimes you find the patient with his head in such a position that he is all tired out. Tell the student to have the patient sit up, or tip the chair back a little to get a better light. Sometimes the student is all sprawled out and in a tiresome position; whereas, if you would tell him how to adjust the chair, he would be more comfortable and the patient be better served. About the mouth mirror, I would like to know how you all handle that. When the patients come into my hands, I have a number of mouth mirrors in a glass of 5 per cent. solution of lysol. Each time I examine the mouth I take a little Johnson & Johnson napkin from the table, wipe off the mirror, and after using it, I turn to the sink, wash my hands and mirror, and put it in another glass of lysol, so it can become sterile before I need it again. In the operating room, I do not use my own mirror. I use the mirror the student is using for that patient. In the matter of sterilizing the students' instruments, we have this year put in a steam sterilizer, which consists of a tank about three feet long, divided in the centre, the lid opening on either side. In that we have a number of perforated copper receptacles. Each student has one. It is numbered, and he is charged with it. When he returns it at the end of the term, we give him a rebate for it. He can sterilize his in-instruments and take the whole thing to his chair and wipe them off.

Dr. A. E. Webster, Toronto, Canada. How do you keep your hands clean?

Dr. Louis P. Hall, Ann Arbor, Mich. We have a number of sinks of running water throughout our room. I have to go to them and wash and wash. That is the only way I can do. It is hard water, and it is hard on your hands, but it is the only thing I know of.

Dr. W. G. Foster, Baltimore

I will just mention the matter of sterilization, and the way we impress it on the student. Each lecturer mentions the importance of this subject in his lecture; the professor of anatomy or whatever branch he may teach, even the professor of prosthetic dentistry, all speak of the necessity of sterilization; the demonstrators are required to follow this up by calling upon any student to sterilize his instruments. We have signs in the various parts of the building stating that all instruments must be sterilized before and after using. It is sterilization all through. Each professor has some favorite story to relate as a horrible example in order to impress it more forcibly. We believe it is from the lecturer that we reach the students better than any other way. The student's idea of the necessity of sterilization is much like his taking a bath in the cooling atmosphere of a boarding-house room during winter. Is it worth the bother? In reference to the broken broach Dr. Webster speaks about, he says it is a fraud. I do not agree with him. You might in your office tell an intelligent patient about it, but it would not do to explain this to all. The other day a patient came to college who was studying at the Johns Hopkins University. At present she is a stenographer, and at the same time studying law. She is an intelligent woman, but has to economize, so she came to the college to have her teeth treated. To a woman like this, should a student break a broach, you could tell her the circumstances, but with Mrs. O'Reilly from the cheap tenement house district, it would be different. If you told her that a student had broken a broach in her tooth, she would have her husband up there the next day to thrash you or the student. This woman would cast reflection on the institution by telling all her friends that an improper operation had been performed. Why inform this class of patients? It is unnecessary when, with a little care, the next day you can probably remove the broken broach, and the patient goes away satisfied. You know you can remove them occasionally, doctor. (Laughter.) The position of the student at the chair is a very important thing. You find them standing off, with one hand at the back of the patient's head, and putting in gold, the doctor says. We have seen them in all kinds of awkward positions. On one occasion I heard a rumpus in the extracting room, and upon entering found the student had, in his attempt to extract a tooth from the patient, placed his knee in her lap. She was expostulating with him when I entered the room, and I heard her say that if he did not take his knee out of her lap she would throw him out of the window. These awkward positions can be corrected by the demonstrator going around and calling attention to this, as well as looking at the operation. I have often seen students talk to patients in the infirmary with a toothpick in their mouth. I call them aside and say, "That is not dental etiquette. Finish your meal at your restaurant or boarding-house, but not in your office."

Dr. H. T. Smith, Cincinnati, Ohio

One of the problems we have to solve in our operative infirmary is the proper utilization of the cases that are daily and hourly presenting, more particularly those that may be used for class or group instruction. The question of individual instruction at the chair is one that has been solved more or less satisfactorily in each school. Where the operation is instructive or interesting, it may be a case of fracture or pyorrhea or of peculiar and difficult diagnosis, the question arises, how can you get that patient before a number of the students to utilize the case for proper demonstration? Our clinic room is a large one, probably fifty by sixty feet, and the daily infirmary practice is conducted in this one room, and this we consider advantageous. We have set aside one chair where the cases just mentioned can be taken, somewhat separated from the other operations, and the students who are not busy may collect around this chair and see the demonstration of this particular operation. It is a peculiarly useful method of utilizing the material that comes to the infirmary. As a rule, it is not difficult to demonstrate to the individual student at his chair; but the utilization of valuable teaching material, at the moment it presents, is something of a problem. The University of Pennsylvania, Dental Department, has an excellent arrangement for this purpose, consisting, as I remember it, of a demonstrator's chair placed within a large bay window, with the steps somewhat raised about it, and accommodating, perhaps, twenty students, the whole a part of the clinic room proper.

Dr. H. M. Semans, Columbus, Ohio

We use our students as ushers. We require in the operative clinic a white coat. We have one student, each day of the clinic session, act as an usher. Not only does he wear a clean tie and clean collar, but his shoes must be clean and he must have his best suit on. It is impressed upon them that they must be exceptionally neat at this time. Of course they have that neatness impressed upon them at the chair also, but at this time they must impress the patient with the idea that there is a young gentleman there to receive them, not someone in a hurry, but someone who will look after them carefully, until they are attended to. If it is a new patient, the usher looks up the proper demonstrator. If the patient asks for some student who has been working for them before, the usher hunts up that operator. Whatever it may be, he acts in the capacity of usher, and is not allowed to do any work that day. The list of ushers is posted, so the student will know beforehand when his time comes. We carry it on through the year, and there is no conflicting. The ushers are taken from the senior and junior classes.

Dr. T. W. Brophy, Chicago

I want to express my appreciation of the communications presented by these three gentlemen. I might state briefly that we are in the habit of having all patients go direct to a room to be examined and assigned. This is a habit we acquired by numerous visits to the New York College of Dentistry. We found it a good thing. The gentleman in charge of this room has nothing to do but examine the patients. Every patient must pass through his hands twice. The student performs the operation, and the patient comes back and has the work examined. There is just one thing more which has only been mentioned casually, that is, the importance of teaching the students how to pose their patients. I have had the opportunity of visiting almost all the dental institutions of this country and Europe, and it is a shortcoming that seems to be prevalent almost everywhere—failure on the part of teachers to show the student how to use the chair properly. The average dental student might as well use one of these plain chairs if it had a higher back. He should be taught the mechanism of the chair and how to pose his patient for the patient's comfort and his own, and how to do the operation in the most satisfactory way. It is part of his dental education, yet he does not do it properly. Another phase of the subject which has not received much attention is the tobacco habit. No student has a right to use tobacco about the college. (Applause.) One of the gentlemen spoke of the student leaving the patient in the chair with the rubber dam on, so he might go downstairs and get a smoke. Things of that kind should not be tolerated. Some of them get as filthy as a smoking car in a train. I do not enter any protest against a man smoking, if he wants to, but he should select the proper place, and the college is not the proper place.

Dr. T. J. McLernon, Philadelphia, Pa.

There is one point that seems to have been omitted. We hear about sterilizing the hands and the mouth mirror and the instruments, but I did not hear anything said about sterilizing the *mouth*. That is one thing that we have taken up in our college. I have provided in the clinic a very strong solution of permanganate of potassium, and we put a few drops of that in water. It is not a strong sterilizer, but there is one thing it will do; it will take out the mucus, and entangled in the mucus are almost all of the germs. I have a peculiar method, perhaps, of speaking to the students, not liking to hurt their feelings too much, yet wishing them to remember what they are told. You mentioned something about students not using the chairs properly. I go to a man and say, "Do you know how much one of those chairs costs? It costs about $150. What is the use of paying $150 if you have to twist yourself up in that way?" This is apt to set them thinking. Then I go after a "lame" student about delayed work, especially prosthetic work, and say, "When you go out, what rent do you expect to pay?" He will not know what I am driving at, so he will say, "About $30 or $40 a month," or whatever it happens to be. Then I say, "How do you expect to pay it when you are at a $5 job for a month?" (Laughter.) There are a lot of other things I could mention, but that is my general style.

Dr. H. E. Friesell, Pittsburg, Pa.

One of the points we carry out in our school is the following out of our technic work. We keep a record of gold work; for instance, when a student takes a sheet of gold and fails to start his filling with it, we keep a record of that. If he has very much void gold, we have him watched by the demonstrator. If it is something he can correct at the chair, the demonstrator corrects it. If the student is really deficient, he is sent back to the technic laboratory to overcome his particular difficulty. We give a regular course of clinics by the best clinical operator we have, who takes the patients, showing each class of work, and performs the various operations before the senior class in sections. This is done in a private clinic room, which we have fitted up more like a private office. The student will see these operations performed by an efficient operator. The roll is kept on the attendance at these private clinics. We have had much dissatisfaction with the general results of the students' conduct in the infirmary. We are going to start in the first of the year with a new plan. It may not work, but I will give it to you for what it is worth. We mark our operations on the point system. We will give our students half a point for the sterilization of instruments and clean hands before an operation. Then the demonstrator, if he thinks he deserves it, will give him another half point, based on the conduct of the student toward the patient during the operation. The things that will be taken into consideration are the order in which his instrument case and bracket are kept, sharp instruments, a clean coat, and the fact that he has a clean napkin or towel on the patient; and I advise each student to have half a dozen or a dozen of the latter for his own use. The condition of the floor around the chair, and of the cuspidor, and his general manner toward the patient, are also considered. These points are kept in a separate record until the end of the term. In gold work each senior is required to make three hundred points. If at the end of the term he has not refused any patients and he is short on points, we will make up from the list of conduct points enough to finish up his operative record. The demonstrator has a charge record against this. If the student manifests any conduct that is unbecoming a gentleman, he can be fined from one to five points.

Dr. R. H. Nones
Philadelphia, Pa.

After hearing these papers, I commence to think the chairman of your Executive Committee very cleverly and very diplomatically wanted to make a suggestion to the teaching body and the members of the dental profession on a point in which I think many of us are greatly lacking, that is, cleanliness. A child will usually follow out what its parent does; a student will frequently follow out what his teacher does. How many of the teachers in the dental colleges and in the medical colleges to-day are examples of what cleanliness should be? It does not require a very observing man to see how untidy many professional men are. It is a striking example. To my mind, if a motto should be hung up over a dental colege, which every student should remember all through his course, and ever after, it is that "Cleanliness is next to godliness." Another one you might hang up is, "To be successful, be clean—not only clean in body, but clean in mind." In the handling of patients we want to be as clean in mind as we are in body. Do not try to deceive your patients; do not try to deceive yourselves, as Dr. Webster has truly said about the broach. Do not be ashamed to let them know, because they may fall into some practitioner's hands who would afterwards find that broach and call the attention of the patient to it, although such a thing would hardly be possible in the dental profession! You had better do it first; it is for your own safety. With reference to tobacco, in the Medico-Chirurgical College, with which I am associated, I am considered a crank in some respects. I make some rules, and one of them is that there is to be no smoking or using of tobacco in the dental department. That department is clean, and I am not ashamed to have anyone go to it night or day. It is not prepared for inspection; it is always open for inspection, particularly as regards cleanliness. We cannot be too careful with ourselves, look into our own faults and correct them. Let us be examples for the students. As I have told my students in prosthetic dentistry, I care very little about them after their first year. I try to teach them enough principles, particularly cleanliness, at the beginning, that they will go ahead themselves. A man who is a gentleman will not have ungentlemanly habits. A man who is naturally clean will not get into unclean habits.

Dr. J. K. Knight,
Boston, Mass.

Dr. Kennerly spoke of using an examination card for jotting down the operation. I think we should impress upon the student the value and the necessity of a complete record of every operation that they perform for every patient. If they get into that habit in their college course, they will carry it out in their practice. We know how valuable these records are. The card system which is used to-day, giving us for each patient an individual card aside from the examination card, the examination card being used and being transferred to the card system, will prove of very great value. I make it a point in my senior class, before they start out, to exhibit to them my method. No doubt other professors do the same thing, but I want to be sure they do. Dr. Brophy said he obtained some very valuable suggestions from the New York College in reference to certain matters. When I was first called to the chair of prosthodontia I made it a point to visit every college this side of St. Louis, and the majority of them received me very cordially. Some of them did not like the idea; they looked upon me as many of the dentists used to when you came into their offices—they were kind of suspicious and would shut up. They thought you were going to steal their thunder. That has been largely overcome, and there is the feeling now that they want the members of other faculties to come to them and see what they do, and get as many points as possible from them. I do not know how large a percentage of the colleges of the country this Institute represents, but I apprehend we are a good deal in the position of the ordinary prayer-meeting—the very people we want to reach we do not get.

Dr. J. H. Kennerly, St. Louis, Mo. We have thirty-seven out of fifty. We have not that representation here, but we have that membership.

Dr. J. K. Knight, Boston, Mass. The point I was getting at is, it seems to me that the value of these meetings depends on our being sure that every college in the country, as far as possible, has the proceedings of this Institute, and that they be impressed with the growing value year by year of this institution's work.

Dr. J. Q. Byram, Indianapolis I did not hear the first paper, but there has been a good deal said regarding the class of patients that should attend a college clinic. As I see it, we do not want what you would call charity patients altogether. My experience with charity patients has been that we can insert plastics and construct dentures. Imagine, those of us who are teaching porcelain work, even though we do it for nothing, inserting porcelain inlays for charity patients. They are not looking for esthetic dentistry. We cannot run college clinics without some remuneration. The patients must pay for services rendered—I like that term. The price of the operation should be more than the mere cost of material. My experience has been that the large class of charity patients cannot pay for high-class work. We are educating young men to build up a practice. They have friends. They encourage those friends to permit them to perform operations for them. If they please those friends, they send others, and by the time a junior becomes a senior, he has a clientele which will carry him through his senior year. Are we to turn away those patients and discourage that young man?

Dr. F. D. Weisse, New York

It seems an intrusion on my part to discuss these purely dental questions, but my long association with all dental details in my college relations places me in touch with all that has been read and said. These papers ought not to come to us at this late hour of our meeting, because so much can be said on these subjects. They constitute a most important part of the education of the dental practitioner, and much of the success of his career will depend upon the fulfilment of what has been advanced in these papers. Cleanliness, cleanliness, cleanliness! It is a rule that I repeat to students continually. When lecturing upon the anatomy of the hand I devote special time to the development of the nails and their proper care. It is absolutely essential that the dental surgeon should have clean and aseptic hands as he operates in the mouths of his patients. The care of his nails by the dental surgeon is most necessary. I venture to say, with all due respect to all present, if you were to hold up your hands that I could find serious faults with your manicuring. Manicure practitioners, as a class, I regard as an "abomination before the Lord." They mutilate the nails, the nail bed and nail margins so as to produce conditions that are positively injurious. I tell a student how to pare and clean his nails. He should never use a scissors or penknife at the free edge of the nail; it should be filed down to the proper length and contour, the latter to correspond with the curve of the fleshy part of the finger. The cut of the scissors or penknife leaves a faulty, dangerous edge; the file makes an edge that does not catch. No professional man in practice, dental or medical, should have his nails extend beyond the finger end. Never insert, for the purpose of cleaning out, any instrument under the free edge of the nail, no knife blade, no nail instrument of any kind, nothing but a nail of the opposite hand should be entered under the free edge of the nail. You know how carefully you guide your instruments as you work at the gingival margin so as not to injure the gum. Think of that care when you treat your nails under their free edges, that you do not push down the epidermis from the under surface of the nail, thereby making a pocket for the lodgment of dirt, etc., not to speak of the irritation that you produce wherever the pushing down is effected. Never use an instrument to cut along the skin margin of the nails; the skin should be pushed back by a nail of the opposite hand. When pushed back in this way there will be shreds of epidermis at the margin which soap and water will remove, leaving a perfectly smooth skin margin. There never should be any redness produced along the skin margin of the nail. One need never have hangnails if the skin margin is treated in this way. It goes a great way towards keeping the hands clean and aseptic not to have points on or about the nails for the lodgment of dirt and bacteria. I say to students: "It is your duty to yourselves and to your patients that your nails be kept in proper condition." I also tell them about my dear old professor, Dr. Valentine Mott, at 80 years of age. A patient would come in and he would wash his hands, and when the patient left the office he would again wash his hands—this was in 1866. I said to him: "Why do you wash your hands again? You did not even touch the patient." He answered: "My dear boy, it is safer to keep up the habit." It impressed me at the time, and I have acted upon it ever since. I always make it a practice to wash my hands at my clinic, and I tell the students to watch me. "If I ever approach a patient without washing my hands, remind me of it." Frequently I purposely approach a patient without washing my hands, and if they do not say to me, "Wash your hands," I take them to task. I go to the dental operating clinic room, and for the benefit of students as well as patients, I say aloud to the students as a body, "Gentlemen, have you all washed your hands?" The point was made by Dr. Nones: "That every teacher in the college is responsible in a great measure for the cleanliness of the students." I heartily agree with him. It should be constantly impressed, not only by precept, but most especially by example. There is another point I want to speak of, and that is sterilization. It is a question which I have considered for a long time, and I want some help with it. You have to keep a cavity dry while inserting a filling, therefore you cannot use a fluid germicide for sterilizing your operating instruments. One gentleman in his remarks said that he took his mouth mirror and put it in a solution, and then took it out of the solution, wiped it with a napkin, and used it on his patient; then wiped it again with a napkin. How many bacteria were on that napkin?

Dr. Louis P. Hall, Ann Arbor, Mich.

Those are Johnson & Johnson's napkins, and a fresh one is used for each patient.

Dr. F. D. Weisse, New York

I remember the incident of a surgeon who was about to perform an operation. He sterilized his hands most carefully, but when he was about to commence operating, he took off his glasses and wiped them with his fingers, and then went on with the operation. How many bacteria lodged on his fingers from the glasses? Too much attention cannot be given to the question of sterilization of instruments, for preparing and filling tooth cavities and for extracting teeth. Is there any way by which an instrument can be sterilized immediately before it enters into or upon a tooth without affecting unfavorably the condition of the cavity that you are working upon and the instrument you are using? I hold that there is a way. Dip the instrument into alcohol, then pass it through the flame of an alcohol lamp, let the alcohol burn off from it immediately before operating with it, and the tip of that instrument will be free from bacteria. I do this with all instruments as I use them in an operation, so that the instrument passes from the instant of sterilization, as the alcohol burns from it, to the tissues where the incision is made. Why not resort to this sterilizing procedure for dental instruments, as you use them in operating?

Dr. J. H. Kennerly, St. Louis, Mo. What effect has it on the cutting edges?

Dr. F. D. Weisse, New York It has no effect on the incision quality of the scalpel. What effect would it have on the dental instruments?

Dr. J. K. Knight, Boston, Mass. I do not find it has any.

Dr. F. D. Weisse, New York I do not know that this procedure is generally resorted to by dental surgeons, but I wish it could be thoroughly tested by them. I propose in the near future to make some positive experiments as regards the efficiency of the procedure in sterilizing instruments. One gentleman has referred to the advantage of sterilizing the mouth. Did you ever think that a 1 to 5,000 solution of bi-chloride of mercury is not a dangerous one. Why not rinse the mouth with it? You cannot have a better disinfectant and germicide. I do not presume to say that you instantly destroy every bacteria in the mouth by rinsing it with this solution, because that is impossible to accomplish with anything that would not injure the mucous membrane of the mouth. But for practical purposes it would produce as near an approach to the condition of asepsis of the mouth as could be obtained with anything else used in the same way. We do not positively know what the advertised disinfectant solutions actually contain—even though the formula (?) is printed on the label. We do know what we have when using a solution of 1 to 5,000 of bi-chloride of mercury.

Dr. J. H. Kennerly, St. Louis, Mo. My remarks were intended as a start; it was added to by others, and the conflagration became larger as it progressed, until you see where the volcano exploded. (Laughter.) The first reply I want to make is this: I did not go into all the minutiæ of the little end of this symposium that was assigned to me. One man says, "You did not say you sterilized your mouth mirrors." I wanted to give the impression that I tried to keep everything clean. That included mouth mirrors, finger nails and everything, including the buccal cavity. We have in our faculty a man whom I hold in the highest regard, and one whom I know would not recommend to any man living a preparation that was not of the highest character imaginable. Since his production of the formula of Peroxident we have adopted it with reference to the cleansing of the mouth. Every student is required to have a glass of that solution, which must be used before the operation and after the removal of the rubber dam. I think that will do what the bichloride solution will do, and it does away with any risk that may follow a bi-chloride solution. It might be possible, might it not, Dr. Weisse, that in the drawing off of the solution of bi-chloride of mercury, you might get a stronger solution than you thought you were using?

Dr. F. D. Weisse, New York

Yes it might be possible.

Dr. J. H. Kennerly, St. Louis, Mo.

In the other case, there is no such risk. If you gentlemen would try this, you would never have anything to regret. In Chicago it is used with most wonderful results, and I do not know that there is anything we can use that would give the happy results that Peroxident does. As to the manipulation of the chair, I also spoke of that. I did not go into detail. I did not mean to infer that I sat the patient in the chair and adapted it to that one patient; but in the different operations required to be done by the student it requires a different position of the chair for each different operation. One operation is in the upper jaw; another in the lower. My idea is that a man ought to be as graceful at the chair as in the drawing-room, if he can be so.

Dr. Otto E. Inglis, New York

The portion I had of the symposium was rather the middle part of it. Dr. Kennerly had the matter of preparing the students for operating in the clinic. Dr. Webster had the conduct of the students during the operation. During the operation it is necessary to include both of these parts, so that in going about from chair to chair naturally we endeavor to show the men how to do the thing in the best way, how to apply the principles that they have learned, and endeavor to correct attitude, manners, etc., at the chair, all at one time.

Dr. A. E. Webster, Toronto, Canada. One speaker used the term "cleaning the teeth." It has been suggested that we should not use that term at all. Should we not ask that the patient clean his own teeth, and after he has done all he can, that we remove the deposits? If a patient comes to us with teeth so unclean that it is quite evident he has made no effort himself, it would be a good thing if we gave that patient a nice little box of pumice stone and an order to buy a tooth brush, and perhaps some permanganate of potash, and tell him to clean his teeth and come back when he has that done, and we will then do something more for him. We have no right to be scavengers. The patient has a right to come to us with clean teeth. The student should teach the patient how to clean his teeth and give him a lesson in prophylaxis. When he comes back we will do something more for him.

A Member. Will he come back?

Dr. A. E. Webster, Toronto, Canada. If not, he has had a lesson anyway which will be valuable to him, and a comfort to the next dentist he visits.

Dr. W. G. Foster, Columbus, Ohio I criticize the term. I think we might call it removal of tartar, or anything else.

Dr. A. E. Webster, Toronto, Canada. We hear often of the napkins being infected. I have made numerous inspections of linen just coming from the laundry. I have cut a piece from the centre of the linen and put it into culture media to see what would happen and found no growth. We hear a great deal about washing the hands, but what assistance do you give students to clean their hands? Do we always supply solutions of green soap, brushes, clean towels, etc.? These things ought to be all ready for the student.

Dr. R. M. Sanger, East Orange, N.J. Does the doctor mean that with these experiments on the linen he got no bacteria?

Dr. A. E. Webster, Toronto, Canada. None, sir. It surprised me very much.

Dr. Ellison Hillyer, New York Did you try the outside?

Dr. A. E. Webster, Toronto, Canada. No, only the centre, because the outside is usually contaminated by the handling; but if such linen were put into bags which were washed in a like manner, there would be little danger of infection from linen.

American Institute [illegible]

Proceedings

PROCEEDINGS

OF THE

Fourteenth Annual Meeting

OF THE

Institute of Dental Pedagogics

HELD AT

Chicago, Illinois

December Twenty-seven, Twenty-eight
and Twenty-nine, Nineteen
Hundred and Six

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Fourteenth Annual Meeting

OF THE

Institute of Dental Pedagogics

MINUTES.

The fourteenth annual meeting of the Institute of Dental Pedagogics convened in the Palmer House, Chicago, on Thursday morning December 27.

President called the meeting to order at 10.50.

Dr. Gilmer of Chicago welcomed the Institute to the city. (See page 15.) This was replied to by Dr. J. P. Root of Kansas City. (See page 15.) and Dr. A. W. Thornton of Toronto (See page 16.)

On motion of Secretary the minutes of last meeting were read and approved as published in the proceedings. Secretary-Treasurer presented following report which was on motion referred to Executive Board:

REPORT OF SECRETARY-TREASURER FOR 1906.

As was the case last year, the publishing of the proceedings devolved upon the Secretary. During the last week in February the Stenographer's report for the last meeting was received and the following day mailed to each member who took part in the meeting. The material was in the printer's hands about first of April. The galley proof was also mailed to each member for correction, some of which has not yet been returned. The proceedings were completed and mailed during September to all those who attended either of the last two meetings.

In October a circualr letter was sent to the Dean of each College in the N. A. D. F. calling his attention to this meeting and urging a large attendance from his school. A short time after a circular was sent to each member of the various faculties in the N. A. D. F. calling to his attention the program to be presented during this meeting and the benefit to be derived from attending.

Number of Colleges, members reported Dec. 28, 1905	37
" " admitted last meeting	2
" " dropped non-payment fees	1
" " resigned	1
" " out of existence	1
Present members	36

FINANCIAL STATEMENT.

Cash from 1905	$199.39
Fees for 1905	10.00
Fees for 1906	340.00
Bank Interest	8.78
	558.17
Expenditure as per vouchers	441.02
Cash on hand Dec. 26, 1906	117.15
	$558.17

Toronto, Dec. 24, 1906.

W. E. WILLMOT,
Sec.-Treas.

Approved:
J. Q. BYRAM,
Executive Board.

Chicago, Dec. 27, 1906.

A verbal report of Executive Board was presented by Dr. J. Q. Byram in the absence of Dr. Hillyer, Chairman. The President called the Vice-President to the Chair and presented his annual address. (See page 17.) This was discussed by Drs. Brophy, Patterson, J. B. Willmott, Noyes, Friedrichs, Black and closed by Dr. Stubblefield. President resumed the chair.

Dr. G. V. Black invited those interested to visit his office and examine an instrument for grinding histological specimens.

The local Committee through Dr. Goslee invited the Intsitute to a banquet to be held in the Palmer House Friday evening.

Adjourned at 12.40 to meet at two.

THURSDAY AFTERNOON.

President called meeting to order at 2.05.

Minutes of previous session read and approved.

Dr. Herman Prinz read his paper on "Teaching of Anesthesia: the Prevention and Treatment of Emergencies" (see page 33.)

This paper was discussed by Drs. Semans, Gilmer, Friedrichs, Peterson, Brophy and closed by Dr. Prinz.

Dr. Buckley presented his paper on "Teaching of Materia Medica, Pharmacology and Therapeutics" (see page 47).

This paper was discussed by Drs. Cook, Long, Jones and closed by Dr. Buckley.

The Executive Board decided favorably on the application of the University of Tennessee for reinstatiment to membership.

Moved by Dr. Byram and seconded by Dr. Kennerly that "on payment of fees University of Tennessee be reinstated in membership."

On the roll of Colleges being called the motion was adopted.

Adjourned at 4.30 until 8.30.

THURSDAY EVENING.

President called meeting to order at 8.30.

Dr. Cattell presented paper on "Operative Technic, Historical and Suggestive" (see page 59).

Paper was discussed by Drs. Johnson, Tileston, Hart, Black and closed by Dr. Cattell.

On motion the discussion was reopened and continued by Drs. Webster, Kennerly, Hoff, Black and Byram and again closed by Dr. Cattell.

Moved by Dr. J. B. Willmott and seconded by Dr. H. B. Tileston and unanimously adopted:

'That this Institute hereby expresses its appreciation of the interesting and complete history of the introduction and development of Operative Technic as an exceedingly important factor in modern Dental education and further, it now places on record its acknowledgment of its indebtedness to Dr. Cattell for a very much larger share in the success of this development than his modesty has permitted him to give expression to in the excellent historic paper just presented.

Adjourned at 10.30 until 10.00 a. m. Friday.

FRIDAY MORNING.

President called meeting to order at 10.15.

Minutes of two previous sessions read and approved.

The Executive Board reported that they had audited the Treasurer's report and found it correct. Report was adopted on motion.

The Executive Board recommended that Dr. L. P. Bethel, of Columbus, Ohio., be made a permanent member of the Institute.

On roll of Colleges being called recommendation was unanimously adopted.

Dr. J. K. Knight presented his paper on "Prosthodontia as taught in Tufts College Dental School" (see page 78).

This paper was discussed by Drs. Hoff, Cigrand, Snow, and closed by Dr. Knight.

Dr. Byram presented a paper on "A Method of Teaching the Principles of Filling Teeth with porcelain" (see page 107).

Moved by H. T. Smith and seconded by H. J. Goslee and adopted that the remaining two papers be read and the discussion of all three be made first order of business on Saturday morning.

Dr. Smith presented his paper on "A Method of Teaching Orthodontia" (see page 121).

On motion the report of Committee on Nomenclature was held over until Saturday morning.

Moved by Dr. Hoff and seconded by Dr. Cook and resolved:

"That a Committee of three be appointed by the President which shall consider the subject of providing suitable text books for use in imparting instruction on the technical subjects. This Committee to report at the next meeting."

Adjourned at one o'clock until 9 a. m. Saturday.

Friday afternoon was spent in visiting the schools and seeing the city in automobiles kindly furnished by Chicago dentists.

Friday evening the Institute was tendered a Banquet in the Palmer House by Chicago Dentists.

SATURDAY MORNING.

Meeting called 9.45. President in the Chair. Minutes previous session read and approved.

Dr. Guilford presented report of commission on Nomenclature.

Moved by Dr. Friedrichs, seconded by Dr. Kennerly and resolved:

"That the suggestion of the Committee be accepted and that an appropriation of fifty dollars or more be authorized to carry out their recommendation."

The report of the Commission was discussed by Drs. Black, Webster, J. B. Willmott, Black, Smith, Brophy, Cook, Black, Brophy and Guilford.

Dr. Byram's paper was discussed by Drs. Reeves and Fickes and closed by Dr. Byram.

Dr. Smith's paper was discussed by Drs. Webster, Jackson, Grant, Hoff, Lischer, Guilford and closed by Dr. Smith.

Report of Master of Exhibits by Dr. F. C. Friesell in the absence of Dr. H. E. Friesell.

REPORT OF MASTER OF EXHIBITS.

Mr. President and Members of the Institute of Dental Pedagogics:

As Master of Exhibits, I have the pleasure to report the following, shown at this session:

NORTHWESTERN UNIVERSITY DENTAL SCHOOL. — Enlarged wooden models of teeth with removable sections to illustrate cavity preparation; and enlarged models of Dr. G. V. Black's instruments for use in lectures. Articulated model showing use of face bow and the arrangement and articulation of the teeth. Instruments, tooth form with fillings, sections of natural teeth and roots, submitted as technic work of students.

CHICAGO COLLEGE OF DENTAL SURGERY.—Specimens of prosthetic work done by freshmen, showing the progressive steps. Tooth sections and vulcanite teeth imbedded, showing prepared cavities of various forms. Tooth carved from ivory blocks and instruments made by students.

UNIVERSITY OF ILLINOIS.—Large plaster models with prepared cavities for porcelain work. Specimens of instruments; prepared and filled cavities in typodont; technic work for moldable porcelain and specimens of crown and bridge work in various stages of completion.

Anatomical exhibit and charts. Special mention is made of this exhibit, as the dissections of the head were such as to display the internal relations of the various tissues with the respective organs in situ.

Vanderbilt University Dental Department.—Crown and bridge technic work; prosthetic technic, with models and plates; operative technic, with teeth carved, roots filled and gold fillings, also the instruments made by students; histological technic, consisting of mounted slides; dental anatomy technic, as shown by teeth mounted in sections.

Dr. Cattell had the material in such quantity as to remove any doubt that his students practice what he preaches.

The Indiana Dental College. —Plaster models showing preparation of cavities for metal fillings, and other large and small models for inlay work. Drawings and baked porcelain specimens showing color scheme. Models showing method of molding, carving and fusing porcelain teeth.

University of Michigan.—Models of teeth showing cavity preparations for metal and porcelain filling, and a number of metal cylinders showing method of soldering taguht in crown and bridge technic; also 500 mounted slides of histological, pathological and bacteriological specimens. It is unfortunate that the imperfect light deprived the members of the Institute from examining the specimens exhibited.

University of Buffalo.—Clay modeling by freshmen students; cavity preparation; contact points and filling.

Method of banding, without swaging, a metal plate of single gum teeth backed and soldered. Articulation diagram showing the dependence of the compensating curve on the inclination of the path of condyles in the glenoid fossae.

Tufts Dental College.—Syllabi of various courses. Cards for checking attendance and steps in prosthetic and operative work.

Dental Department Western University of Pennsylvania.—Plaster models with cavity preparation, color scheme; display of the progressive steps in porcelain crown work; specimens showing results of over and under fusing. Exhibit of prosthetic work done by freshmen and junior students, showing the various stages in construction of each. Rosters of work required and method of keeping record by demonstrators.

New York College of Dentistry.—First year technic, operative and prosthetic. Carved plaster teeth with cavity preparation, and natural teeth with fillings, porcelain, amalgam, tin, and gold, and anatomical study of teeth. Plaster models, vulcanite plates, partial and full, with repairs. Interdental splint, obturator and orthodontia appliance.

The exhibit this year is of such proportions as to evidence an interest still existing in this department of the Institute, and the responses to solicitations are appreciated. It is a pleasure to report a very satisfactory attendance in the exhibit room before and after sessions, a clear proof that the interest in this department has not waned. Permit me to say what has been said before, do not leave your exhibit at home because you have nothing new. Every year the exhibit is held in a different part of the country and your exhibit is new. Bring it with you, show what your College is doing, and encourage your teachers and demonstrators to take an interest in this meeting by having them take part in preparing an exhibit. I hope that next year will bring a larger exhibit, with many more Colleges represented.

Respectfully submitted for
H. E. Friesell,
Master of Exhibits.

It was moved, seconded and carried that the report be adopted and printed in the minutes.

Report of Master of New Teaching Facilities was presented by Dr. E. C. Jones.

Moved, seconded and carried that the report be accepted by title and entered on the minutes.

REPORT OF MASTER OF NEW TEACHING FACILITIES.

As a prelude to this report we offer the proverbial excuse for its briefness, that is "non-support." Whether it is the custom of our respective Deans to look lightly upon the report of this committee or whether our schools are really making no progress I can not say, but I am forced to make this deduction that it is apparently not the desire of our august members to enhance the working of this particular committee. I believe they are derelict in the performance of their moral duty toward this society in neglecting to inform this and the other committees of progress made in their schools.

I will say, as has my immediate predecessor on this committee that if you gentlemen desire the report of this committee to contain wholesome and specific matter, you should lend your support. By doing so, your committee would not be compelled to devote the first one-half of the report to innuendos and the latter half to subtle English, as a means of avoiding the real issue.

Through the courtesy of the publishers, the following new text books were submitted for review:

"Tigerstedt's Text Book on Physiology," by Robert Tigerstedt, of the University of Helsingfors, Finland. Translated and edited by John R. Murlin, A.M., Ph.D., of the Bellview Hospital, Medical College, New York. D. Appleton, Publishers.

This well known text book has been the standard text upon Physiology of German Students since its first publication, 1897. The chapter devoted to biology needs to be especially referred to, because of its many admirable features.

The exhaustive treatment of the subject of the central nervous system is another splendid feature of this most excellent work. The book is replete in practical and beautiful illustrations. The work has special features to commend it to the dental teacher in that the organs of special sense are treated of in athorough way. A practical and simple arrangement of the different subjects in the book, make it easy for the teacher in assigning study for the students

"Histology and Microscopical Anatomy," by Jeremiah S. Ferguson, M.S., M.D., Connell University, D. Appleton, Publishers. This book presents the subjects of Histology in a splendid manner. It is thorough and most beautifully illustrated with photomicrographs. The subjects are admirably arranged. The chapter devoted to the teeth and jaws contains perhaps more information upon these parts particular than the does the average text book upon the subjects of general Histology.

Materia Medica and Pharmacology,"" by David M. R. Culbreth, Ph.G., M.D., University of Maryland (fourth edition). A good text from a pharmaceutical viewpoint—in that the individual drugs are chemically and botanically treated of. The arrangement is splendid. The book commends istelf to the teacher as a splendid reference to the subjects of Materia Medica and Pharmacology. Lee Brothers, Publishers.

"Materia Medica and Therapeutics" (sixth edition), by John V. Shoemaker, M.D., L.L.D. F. A. Davis, Publishers.

An excellent text book upon this subject. It contains, aside from specific information upon Materia Medica and Therapeutics, several chapters devoted to general therapeutics, which can not help but be of interest to teacher and student. The drugs treated of are arranged alphabetically and not in family groupings; this feature makes it a splendid text for the study of Materia Medica. But not so well adapted for the study of Therapeutics.

"Pharmacology, including Therapeutics, Materia Medica, Prescription Writing, etc." (second edition), by Torald Sollman, M.D., Medical Department, Western Reserve University. W. B. Saunders, Publishers.

The author of this exhaustive work has given the teacher in the departments of Materia Medica and Therapeutics, a splendid reference book. The book contains outlines for laboratory exercises in these branches, also an excellent chapter on Technic and Apparatus, for experimenttal work upon animals. This text book presents many favorable features to the teacher instituting laboratory exercises in Pharmacy and Pharmacology.

"Pharmacy and Prescription Writing," by Bernard J. Fantus, University of Illinois, Chicago Medical Book Co., Publishers. This book presents a splendid outline for the beginners in Pharmaceutical laboratory exercises. It has admirable features expressed in its arrangement. It treats of pharmaceutical forms of remedies. The chapters devoted to prescription writing are full of detail and specific information. The author's efforts should receive the highest commendation.

"The American Illustrated Medical Dictionary" (fourth edition) by D. A. Neuman Darland. This attractive volume is replete in illustrations and the newer nomenclature and simplified form of spelling are used.

"Atlas and Epitome of Dentistry," by Prof. Gustav Priswerk of Basil, edited by G. W. Warren, M. D., Pennsylvania Dental College. W. B. Saunders, Publishers.

This text has little to commend it to the teacher aside from the fact that it has been well written and edited. I is devoid of any information except that which our American literature has or now contains.

The work represents the extent of import a medical man may place upon the technical skill necessary to modern dental practice. The book is splendidly illustrated and it contains considerable reliable information, relative to pathological lesions liable to be found in the mouth.

The chapters upon operative procedures represent a misguided effort upon the part of the author in comparison to the system in vogue in this country.

The condensation of the whole category of dental subjects into one text, as is found in this work, is to be deplored—being too large a field for proper consideration in one brief volume.

Much might be written derogative to the whole work. But I feel that enough has been written by other reviewers of dental literature.

"The American Text Book of Prosthetic Dentistry," by Charles R. Turner, University of Pennsylvania. Your committee believes it is duty bound to herald the advent of this new text. We have not had the opportunity of reviewing this work. But from some advanced copy and favorable reports, I do not hesitate in commending the book as edited by Dr. Turner.

"Materia, Medica Therapeutics and Pharmacology," by George F. Butler, Ph.G., M.D., University of Illinois, Medical Department (fifth edition), W. B. Saunders & Co., Publishers. A text book well written and splendidly arranged, covering the whole field of Materia Medica and Therapeutics very thoroughly.

A number of schools have introduced a new appliance in the form of a Reflectoscope, which is an excellent apparatus for projecting pictures upon the screen. A decided advance over the old stereoptican.

The Northwestern University has introduced, through the ingenious mind of Dr. Black, many new forms of apparatuses for grinding sections of teeth, testing the compressibility of plaster of paris, and an instrument for testing the power of the thrust of an instrument held in the hand of the operator.

A full description of these instruments can not be given in this brief report. But we hope their mention may stimulate those interested to investigate their worth as aids to scientific teaching.

Royal College of Dental Surgeons, Toronto, Canada, has a splendid system of keeping records of fillings and treatments.

Chicago, Dec. 28, 1906. E. C. Jones.

Election of officers for ensuing year resulted as follows:

President	J. H. Kennerly.
Vice-President	W. E. Willmott.
Secretary-Treasurer	B. E. Lischer.
Executive Board	D. M. Gallier.

On motion Dr. Byram was requested to act as Chairman of Executive Board for ensuing year.

The Secretary was instructed to write Drs. Hillyer and Friesell expressing the regret of the Institute at their absence from the meeting.

On motion a vote of thanks was presented to the retiring president and Secretary.

On motion of Dr. J. B. Root, seconded by J. Q. Byram, the hearty vote of thank was tendered to the Professsion in Chicago for their very hospitable way in which they entertained the Institute.

The minutes of session were read and approved.

Adjourned at 1 p. m.

At a meeting of the Executive Board, held immediately after adjournment, it was decided to hold the next meeting in New Orleans, on Dec. 30 and 31, 1907, and Jan. 1, 1908. Dr. F. C. Friesell was appointed Master of Exhibits and Dr. N. T. Yager, Master of New Teaching Facilities.

APPENDIX A.

List of membership colleges with representatives present:

University of Buffalo Dental Department.—G. B. Snow, E. H. Long, L. M. Waugh, C. K. Buell.

Dental Department University of Illinois.—G. W. Cook, A. G. Nanonan, F. J. Roach, G. W. Dittmar, C. B. Meek, C. E. Jones, F. C. Zapffe, Louis E. Bake, D. M. Gallie, B. J. Cigrand.

Tufts College Dental School.—J. King Knight.

Department of Dental Surgery, Detrot College of Medicine.—E. C. Moore.

Ohio College of Dental Surgery.—H. T. Smith.

Vanderbilt University, Department of Dentistry.—D. R. Stubblefield, D. M. Cattell.

Department of Dentistry, Washington University.—J. H. Kennerly, H. Prinz, W. M. Bartlett, B. E. Lischer, L. M. Cox, E. P. Brady, H. F. D'Oench, E. L. Beattie.

Indiana Dental College.—J. Q. Byram, C. R. Jackson, C. D. Lucas, G. E. Hunt.

College of Dental and Oral Surgery of New York.—J. I. Hart.

New Orleans College of Dentistry.—A. G. Friedrichs, L. D. Archinard.

Chicago College of Dental Surgery.—T. W. Brophy, C. N. Johnson, C. S. Case, H. J. Goslee, J. P. Buckley. W. A. G. Logan.

Pittsburg Dental College.—J. S. Ashbrook, F. C. Friesell, W. L. Fickes, J. H. Crawford, F. H. Magill, J. F. Biddle.

Western Reserve Dental College.—Edw. E. Belford.

University of Tennesee, Dental Department.—Joseph T. Meadors.

Royal College of Dental Surgeons.—J. B. Willmott, W. E. Willmott, A. E. Webster, H. Clark, E. C. Abbott, A. W. Thornton, R. J. Reade.

St. Louis Dental College.—W. F. Lawrenz.

University of Iowa College of Dentistry.—W. S. Hosford.

Philadelphia Dental College.—Leo Greenbaum, S. Guilford.

Pennsylvania College of Dental Surgery.—J. E. Nyce.

New York College of Dentistry.—C. F. Rabell.

Dental Department, Ohio Medical University.—H. M. Semans, H. V. D. Cottrell, Alden Bush, Karl C. Brashear, R. W. Deyo.

University of Michigan, Dental Department.—N. S. Hoff, L. P. Hall, W. T. Reeves, R. W. Bunting.

Northwestern University Dental School.—G. V. Black, F. W. Gethro, Thos. L. Gilmer, Emund Noyes, J. H. Prothero, A. D. Black, Fred. B. Noyes.

Kansas City Dental College.—J. D. Patterson, J. P. Root.

Louisville College of Dentistry.—H. B. Tileston, N. T. Yager.

Visitors.—F. W. Slabaugh, F. M. Condon, P. T. Barber, N. P. Rasmussen.

APPENDIX B.

Membership Colleges not represented: College of Dentistry, University of Minneapolis; Dental Department, University of California; Dental Department, University of Pennsylvania; Baltimore College of Dental Surgery; Cincinnati College of Dental Surgery; Dental Department, Milwaukee Medical College; College of Dentistry, University of Southern California; Howard University; Colorado College of Dental Surgery; Wisconsin College of Physicians and Surgeons, Dental Department; Georgetown University, Dental Department; Dental Department, Medico-Chi.

ADDRESS OF WELCOME.

BY DR. THOS. L. GILMER, CHICAGO.

Mr. President and Gentlemen:

In my estimation no profession stands higher in the minds of the public than the teaching profession, those occupying their time in moulding the minds of the young. If anyone present accepted a professorship without due consideration and without a full knowledge of the responsibility conveyed thereby, he made a great mistake. We should realize the obligations imposed by the occupation of teacher. We must direct the mind of the young into right paths; we must direct them so that their lives will be of greatest possible value to themselves, to our profession and to the people. What greater or more important work is there to be done? I congratulate you in the service you are performing.

I wish to assure you, gentlemen, that the dental schools of Chicago as well as the dentists of Chicago, and the citizens of Chicago, extend to you a most hearty welcome. If you do not enjoy yourselves during your stay in Chicago, it will be your fault, not ours.

RESPONSE TO THE ADDRESS OF WELCOME.

BY DR. J. P. ROOT, KANSAS CITY, MO.

Mr. President:

I can vouch for the cordial welcome extended us by Chicago through Dr. Gilmer. I know whereof I speak. I am always glad to come to Chicago. I may say that without exception the Chicago dentists are the most progressive, the most hospitable of any men in the United States, and while they may have discord in their ranks, as is true in every community, except St. Louis and Kansas City, yet in Chicago dissensions are never publicly aired. They are apparently on friendly terms with each other, and every deserving man has a good standing in his community.

I am really unable at this time to express my appreciation of the hospitality of the Chicago dentists, but they know that I do appreciate it.

RESPONSE TO THE ADDRESS OF WELCOME.

BY DR. A. W. THORNTON, OF TORONTO.

Mr. President:

Let me say on behalf of the men from the frozen North that we are glad to come as far South as Chicago to get warmed up. It is always warm here. This the Mecca of dentistry.

Dr. Gilmer touched on a subject that might be enlarged on and emphasized, the cultivation of ideals in our students. We come here to get ideals, and I believe that in the future we will come together not so much to gather or to disseminate ideals as to establish them. I believe that dentistry has reached almost a stage of perfection, from the mechanical standpoint. I can not see that there is much more to be developed, but I can see that we have ideals that have not yet been attained, and I believe that our duty in the future is to develop these ideals.

I remember reading some time ago a little incident of a man who had the artist spirit within him. He was studying with one of the masters and he strove day after day to attain his ideal, but he never could satisfy himself. After studying his picture one day for some time, he left it, discouraged. While he was away, the master came in, put a little touch here and a little touch there, which seemed to transfigure the student's picture. When the student returned, and looked on his picture and said: "It is the master's touch." That is what we want to do for the boys who come to us. They have ideals; they are struggling, and it is our duty to put on their picture those few touches that are the master's touch. This, perhaps, is not always possible, but we can do a good deal to cultivate the student's ideals.

You all remember the beautiful incident told about Benjamin West, how his mother spoke of his attempt to portray the sister sleeping in her cradle. The mother thought she saw a likeness there, and she spoke kindly of his effort. That made West an artist. And so we must not fail to recognize in our students the great value of the personal factor. Dr. Osler says that no matter how great the institution, how perfect the apparatus, how well-equipped the laboratory, that unless there is in the educational institution the personal equation, the contact between teacher and taught is of no value. And so I trust that we will come here with higher ideals. On behalf of the men North of the great lakes, I desire to thank you for the hearty welcome you have given us.

PRESIDENT'S ADDRESS.

BY D. R. STUBBLEFIELD, NASHVILLE, TENN.

Fellow Members of the Institute of Dental Pedagogics:

In obedience to the dictum of precedent, your Chairman comes before you to-day with an annual address. This duty has long since ceased to be an easy task. The field of our enterprise has been so often traversed and the minds of our presiding officers have been so acute, that novelty, to say the least, is almost, if not entirely impossible. Nevertheless, it is hoped that the theme that is presented to-day shall exhibit sufficient pertinency and force to call forth your interest and even your patient attention.

For many years it has been evident to some of us that we have suffered more from a lack of means with which to teach than from a just realization of what should constitute a thorough course of instruction. We early recognized the necessity of having the minds of our students as well developed and trained as possible, and to that end we have co-operated in raising the standard of preliminary education. Indeed, to some of us, who remember the comparatively excellent results produced in the earlier years, when the subject of preliminary education was practically not discussed, we have gone prohibitively high in our standard of matriculation. To go even further, there have been occasional indications from some highly esteemed members that too much time has been devoted to pure cultivation of mind that might have been more profitably used in exercises to produce finger-craft, or manual dexterity, so essential in our calling. Personally, we occupy a position between the two extremes on this subject, for we have never been able to forget that practice is but the visible output of the mental conception, that there never was any work done that was not first clearly seen by the mind directing the hand of the doer. However, in the work of improvement along the line of our duty, as teachers of teachers, we have found stumbling blocks to our progress. Some of these have been removed, and others are impeding our advance still. One of these, to our mind, is the LACK OF PROPER TEXT-BOOKS.

With this proposition some of you may not agree. That being the case, your intelligent discussion and presentation of your adverse convictions, will help to clarify the situation and make others of us see the light of truth.

We do not deny that so-called text-books have been endorsed with full authority from time to time, by intelligent committees and that they have, per force, been accepted by this and other bodies of our profession. But we would suggest that it has become almost farcical to thus approve them, although they are the best that are presented, as adequately and satisfactorily meeting the demands of the case. In this, we are not unmindful that it is easier to criticize than it is to produce, and we would not have it supposed that we are disposed to condemn all the books extant, as utterly without worth or value. No; what we hope to show is not that the so-called text-books are not good professional books, but that they are not as good TEXT-BOOKS as the students ought to have. To the matured professional man, whose mind discriminately knows what he wants, what he needs, to establish a clear conception of an every day problem, our books are probably adequate. They are valuable and it would be little short of audacious trifling to attempt to say or prove otherwise. We trust that our position on this point shall not be misunderstood. Indeed, if we fail to make our idea so clear that it must be understood, our point is lost and this annual address is a failure, by our own confession.

If then the socalled text-books are valuable, if they run over with information that makes up the sum of all our professional lore what under Heaven is the bone of our contention? We pray your thoughtful attention to several convictions.

First, the average student brings to the study of our courses a mind that is relatively, if not entirely, untrained. Within certain limitations it is only the trained mind that can get out of a book what is in it. Again, within certain limitations, it is only the trained mind that can grasp certainly what is spoken to it by even an experienced teacher. We all admit the fact that the undeveloped body must get its nutrition from carefully appropriate food suited to rudimentary digestion, but we blindly overlook the equally potent fact that the mind may suffer from a similar lack of appropriative power. Attention and a rare determination to understand may do wonders in certain isolated cases, but our contention applies to the rank and file of students.

Second, our courses are entirely to short and too full to certainly overcome this lack of training and yet too long to give hope of making an impression by reiteration. A tacit admission to this may be seen in our efforts to increase the time for a session, and to increase the number of sessions necessary. This is all very well. We are not, however, one of those who seem to think that length of term, or number of sessions, measures arbitrarily the results to be obtained. We have never been able to believe that length of time must mean excellence of results in the ratio of the extension, for if that were true the hangers on, so to call them, around every college would ultimately become wonderful repositories of professional knowledge. What we exactly mean is that a certain amount of time is required to become mature in knowledge and to develop that CERTAINTY OF MIND, which, after all is said, must forever be the sum and substance of education. So much has been concentrated in our plethoric courses of instruction that the wonder is not that students get so little, but that they are able to digest as much as they do from such a mental stuffing as it is. The American student, true to our ethnological weakness, is a hustler, and we the teachers are *particeps crimines* in not only permitting but compelling him to rush and stuff in his work.

So much for the fault of the students. What about the lacking to be found in our present text-books? In our opinion, they are too encyclopaedic. Understand, not too rich in contents, nor lacking in intrinsic worth, but too large for the average student to grapple with, to get the good out of. We very well remember our own sensations, when, though fresh from completing an "A. B." course, we were confronted by Gray's Anatomy and other seemingly interminable text-books on other subjects. We were paralyzed, to use a modern expression, by the tremendous task before us. We are convinced that size of itself appals the young mind, especially if untrained.

Again, aside from the depressing effect of large size, the actual contents present too much that is largely obsolete. It seems so, strangely enough many of our authors feel that they must pad out a book to get impressiveness from size, if nothing else. In this we do not decry a necessary largeness when the demands of the subject fully justify, although the criticism of our old professor of English comes up very forcibly, when he says: "If a man can not condense his verbiage to a brief but clear expression of his ideas, he is not entitled to a medal for English composition." Without making, or intending to make, any invidious distinctions, look at that honored and honorable book, a very classic in dentistry, Harris' Principles and Practice. We can not help but believe, to use it as a type, that it is filled with too much that is of a historical nature and value for the best interest of a student. The ideal text book should contain sufficient instructive matter to give clearly the latest, newest teaching to the student, leaving for a later time the valuable study of history. It is all very well for him to know of the methods and ideas that have been outgrown in the progress and development of our profession, but we do not think he should be more or less embarrassed with it while he is engaged in grasping a clear view of the principles and practice of Dentistry. We do not plead for any such thing as a suppression of any historical data, but we ask that the two be separated, be classified, as of distinct value in proper place. The books mentioned may present in the round-up all that we ask for, but we plead for a text containing all that is essential to instruct, without a preliminary presentation of so much that may be said to be obsolete and therefore confusing to the student who has no judgment regarding such matters. In a word we would have a series of concise, up-to-date text-books, full enough to include all essentials, yet brief enough to inspire the student with the hope that he can master everything they present. Let them get from the teacher the vitalized meat of the subjects and then find that his books supplement that with clear-cut exposition that shall clinch the nail driven by the lecturer. The need for this sort of a reformation has been driven in upon us personally more strongly, perhaps, than on some of you by the fact that we have been changed several times, in the years, to different branches. Each man of you may easily test this idea by trying to find a satisfactory text, with which you may clearly and definitely supplement your instruction, a book that certainly will carry the golden thread of your idea without obfuscation or confusion to the end. It must not be forgotten that we do not charge that all of this corroborative material is without value, but we claim that immature minds find themselves snowed under, as it were, by this superabundance of knowledge and fail to get the central, important idea that is so apt to be obscured. The beginner is unable to discriminate between the essential and the non-essential, and the teacher can not always be on hand to help him. You yourselves find no trouble, but years of thinking and practice have made your minds certain. There was a time when your youthful powers were no more certain than theirs, when you struggled along the unblazed trail of knowledge never certain you were going in the right direction. It is the experience of all beginners.

If our text-books, on the contrary, were as brief as possible, straight and simple, they would afford a strong, true foundation of salient facts that might be limited in scope, but would give a certainty of mind, a proper basis for all future extensions under the demands of professional life and experience, As collegiate instruction can not make a man, but only hopes to awaken his mind to think in certain channels, it will be fortunate if we can confine that instruction to easily assimilable principles, which may the more readily prove of practical value to the ambitious student. A clear grasp upon the subject aimed at, a definite mind-picture of the practical result in its simplest expression, gives a solid basis on which the beginner may stand confidently. After that end has been accomplished, the exception "that proves the rules," and all the other variations that maturity knows may be received and accounted for without loss of that certainty of mind which we have already defined as the only measure of education.

We know this is difficult to attain. It may be a dream that we can never realize. We have already admitted that it is far easier to criticize than it is to produce the desired change. If it were not difficult it would long since have been done. Our text-books writers would, of course, prefer to hit the nail on the head and if they had their choice every book would prove itself the ideal assistant that it was intended to be and may have been thought to be by the maker. But we claim that the subject of a perfect text has not been sufficiently appreciated by those who teach. Here's an illustration that may make our idea clearer. A young medical graduate organized a quiz class on Physiology. Being a young graduate, the essential, fundamental principles of the subject constituted the most of his preparation for his task. He did not know enough, so to speak, to grow discursive, but had to stick close to the presentation and reiteration of the simplest principles. Entirely unconscious of it he was the ideal teacher and was planting simple facts that were not complicated by any extraneous, though possibly valuable extensions and discussions of related facts. But by degrees his knowledge grew. He became well acquainted with what was said by other authorities than his one text-book, he knew what disputants said and what was being added from time to time by investigators. This knowledge began to creep into his quizzing and reviews unconsciously and to complicate, as it proved, those simple, easily digested facts that had been the strong diet with which he had fed students hitherto. The result was that he found his classes not so well instructed as before. His reputation as a successful teacher was not so pronounced and his classes were not the source of pride that they had been. There's the point in a nutshell.

He had the facts, the principles, as before; he was just as honest and conscientious as before; but he had unconsciously obscured the bare, fundamental facts with a more liberal knowledge and he could no longer reach the mental grasp of his students, nor fill them with simple digestible food.

Our text-books have become text-books in name only for this simple reason. It is quite usual for sundry teachers to suggest to the students, more especially as reference books, large compendious volumes, for their use. Again, without invidious distinctions, look at the American System of Dentistry. It is largely a compilation of excellent essays on subjects more or less related, but we would suggest its utter unfitness for a student who wishes to grasp on the simplest presentation of a profession. The published proceedings of our societies closely resemble it and have the advantage of appended discussions. You may say that this feature is valueless because the discussions would most likely go above the heads of the students, but surely if they can understand the articles themselves they may just as certainly be benefited by their clear discussion. But, we believe the objection well taken and that that form of instruction is from the nature of the case, unsuited to carry definite, intelligent conviction to the untrained minds with which we deal. This condition of affairs brings to mind another illustration to the end that order and method and sequence are frequently as important as material. Building material may be of the best quality and of a sufficient quantity, and to the matured builder they present the idea of the finished structure ; but the bricks and stones and wood and slate are not a house to the mind of him who has just begun to work in the builder's realm. It is the part of wisdom to recognize the true condition of affairs and to take intelligent account of the limitations that are, even though we may have to confess that they ought not to be. Results are what we aim at, and results must forever be the measure of our success.

In conclusion, a word as to how we think perfect text-books could be made, let each author deliberately write out as simple an exposition as he possibly can of the essentials of his special subject. Let him revise this bare skeleton and clothe it with just enough embellishment to round it out harmoniously but not obscure it. We believe that authors are afraid to thus rest their fame on simple unavoidable clearness. But the experienced teacher must know that convincing lucidity brings or may bring a certainty of mind that is worth many times the more ornate and conventional book that may possibly be grasped by the student. We are doing the best work for the student when we make a few things very difinite rather than give him a vague idea of many things. Definite results, though failures, are the only results from which growth of knowledge may be derived. Let us then, strive with simple text-books to make clear the fundamental facts of Dentistry.

Discussion of the President's Address.

Dr. T. W. Brophy, Chicago. I listened to the President's Address with pleasure. The teachings of the paper are based on the soundest principles, showing that he has given the subject a great deal of thought. We have recognized for many years that the text-books we employ are not suited for the purpose for which they were intended. The lovable Dr. Garretson, whose memory we all revere, prepared a text-book on the Principles of Oral Surgery. That book contained almost everything in the domain of dentistry. We all know that that distinguished teacher, author and orator was a master in the field of oral surgery. He was the father of oral surgery. He was the first to place it on a firm footing. But he was not content to write on the subject of which he was a master, but he saw fit to include in his book material that concerned the other departments. Therefore, the book was immense in size, a fault of many of our text-books. I did my best several years before he passed away to get him to revise his book on oral surgery, eliminating everything that did not bear on that subject. But he was rather desirous of having it stand out as a book of value to students in other departments. I think the world lost a great deal by not having a book from him the last years of his life on the subject of oral pathology and surgery only.

The President speaks of the teaching of principles. I believe that our text-books should be confined more to the teaching of principles, and not so much space given to the consideration of special things that come to us in daily practice. Truly, the short period of time that the students devote to the learning of dentistry will not permit them to take up all the different features of practice in every detail. Their time should be devoted to the learning of principles, and after these have been well fixed in their minds they should be put to the learning of practical things, but not before. Such men will become more skillful and useful practitioners, because they know all about the principles underlying the work they are doing. I can not praise too strongly that feature of the President's Address in which he dwells on the teaching of principles.

A text-book ten years old is in the main obsolete. An author should revise his book every few years, and eliminate that which is no longer regarded as the best, and embody in it the more advanced ideas. A book on physiology issued fifteen years ago is old-fashioned. It does not teach modern physiology, a branch which we would naturallly presume to be nearly unchangeable in our curriculum. But physiology has advanced more rapidly perhaps than any other science, and the teacher of to-day must not rely on books issued ten or fifteen years ago, if he would teach modern physiology.

An author is always open to criticism. He who makes a book must expect to be set up as a target to be fired at by those who desire to do so, and he always finds many who so desire. Criticism when given in the proper spirit always does good. The author learns of his errors, and when he revises the book he will be able to prepare a better book than it was at first. Criticism is not at all objectionable, provided it is fair. Of course, a gentleman will always be a gentleman, whether he reviews a book or whether he is engaged in conversation with his fellows. A criticism coming from such a man is always of value to the author.

Another feature of the President's Address that I desire to speak of is the fact that the proper persons to make books are the teachers. A man who sees fit to retire from his position as a teacher gets out of touch with the students' desires and lines of work. He can not write a book that will be of the best service to the students. The very best book that it is possible to produce for the use of students and practitioners is the book that is written by the teacher, a man who is qualified to write by reason of the knowledge acquired. But, he must be in touch with practical things. I hear theorists say that it would be a good plan if dental college professors be given compensation enough to enable them to do nothing else but teach. I believe, gentlemen, that that would be a great misfortune, and I hope that the time never will come when that will hold good; when the profession permitted a faculty to be made up of teachers and not of busy practitioners. Teachers need the stimulus of practical work; the assistance of the complications and changes attending the pursuit of the practice of dentistry to fit them to be teachers. Therefore, I think it would be a misfortune to the dental institutions of the country if men were retired from active practice and permitted only to teach.

The President spoke of the tremendous rush which students must be in from the day they enter college until they graduate. It is true. It is a rush, but it is only in keeping with the life we lead.

The late Benjamin Harrison, in an address delivered before a religious body in Philadelphia, once said: "Life is strenuous. The boy enters school on the hum, and scarcely slackens his step until the panting man falls into his grave." And so it is with us. We work from start to finish. There is no body of men that works harder than the dental profession. But he who is a dentist and a teacher works harder. The dentist who is a teacher lives about as strenuous a life as it is possible for a man to live. He gives little time to rest and to social intercourse. His life can not be compared with that of the merchant. He has little chance to engage in all the delightful social recreations that mean so much in life. He has his professional work to do as well as his college work, and when night comes he must continue his studies and gather information that can not be gathered for want of time during the day. He must read his journals, conduct his correspondence, prepare his papers, and his lectures. All the good text-books we have have been written at night, when the author was tired out, and when he should be taking a rest.

I wish to congratulate the Institute on what the President said. This paper means much, not perhaps in the words contained in it, but in the thoughts which those words have clothed. It stimulates every man who has prepared a book, as well as those who contemplate the preparation of a book, to do differently than they would have done if they had not heard this paper. The authors will profit by this paper, and the student will profit by this paper, because it will be the means of giving them more complete text-books, which will aid them in acquiring a more perfect knowledge of the various subjects presented.

Dr. J. D. Patterson, Kansas City, Mo. I am not a writer of books. I wish I had the ability to write books. But I have a great respect for the writers of books, especially of those books about which we have been talking. The writer of a book occpuies a very exalted position, and he has my most profound respect. I know he has your profound respect. He teaches and preaches to all men in all times and in all places. He writes at times which for the purpose of the conservation of health at least could be better spent. Any man who will spend his odd hours and nights at such work demands our serious respect and consideration.

I have been very much interested in the Address. In the begining of the paper a remark was made in regard to preliminary eduration; that the pendulum swung too high; that we demand too much. I have never yet seen the school which demands too high a preliminary education, because I find, especially in the branch which I attempt to teach, that it is the most difficult thing to inculcate during the time that I have at my disposal the simplest principles into the minds of the students, because they do not have analytical minds. We have minds that can cram. We enlarge on various subjects, but it reminds me of the old saying that "knowledge comes, but wisdom lingers." We want that ability to put into practice the teachings we try to convey. I have not found at any time, in any college in this country at least, that the preliminary requirements were too high.

The keynote of the paper was the criticism of text-books, and I think that some of them ought to be criticized. I do not criticize their encyclopedic nature so much as our President has done, because I believe that in the various departments it is quite necessary to give considerable of history, in order to give the student the best understanding of what we are doing, not only in practice, but in theory. The writer of a text-book can not leave this out, because the text-books are for students more especially, and many of our students can not have many text-books. They must be encyclopedic in nature. In pathology, and especially in therapeutics, they must have a history of what has led up to our practice of to-day, else these books would not be intelligible. Therefore, I do not object so much to that, because we can select what we desire, but I do criticize sometimes teachings on the subjects of etiology and pathology found in nearly all of our dental text-books. I will refer to only one as an illustration of what I consider the incorrectness of what is taught in our text-books. They tell us that the disease of the investing membranes of the teeth continue until the latter are loosened and drop out, and this from systemic causes alone. Much of that teaching ought to go to the dust pile.

It is not very easy to criticize the President's Address. I think it is a very fine one. But on account of my appreciation of the man who is a writer, I feel for him, and realize that there should be a community of interests in the text-books. Furthermore, there is no writer of a book who does not displease someone. He can not please everybody. The critic has a place on the ground floor, and the writer of the book is on the fence, and is likely to be dislodged by criticism. It reminds me of an old saying, "Let him not boast that putteth the harness on as he that taketh it off." So I would like to hear from some writers of text-books. The critic sits in his easy chair, "even as you and I," and he finds fault, and "the devil may care" on whose toes he may tread, for who will try to criticize the critic, "who never can know or never will know" that he may be wrong. But after a while the critic may get a jar, and so we must remember that our text-books are the result of a great deal of pains and labor. If the President or I were to write a text-book or two, we would appreciate very much mild-mannered criticism.

I have been pleased with the address and I think that the subject it brings to us is an exceedingly important one. I have often wished that we could return for a short time to the fifteenth or sixteenth century, where in certain countries there existed a Board of Censors who passed on a text-book before it went to the press, and before it was placed in the hands of the teachers and students. Then we might have not only individual opinions, but a consensus of opinion from a committee which would be similar to the committees of the olden times.

Dr. J. B. Willmott, Toronto, Canada.

I have listened to the paper with very great interest, and to the discussion of it with equal interest. As I understand it, it was the purpose of the President to refer to three points, the preliminary education, the time of teaching, and text-books. The text-book question has been pretty well discussed, therefore I will refer to the other two questions.

It has always been a matter of great regret to me personally that the members of the National Association of Dental Faculties did not have the courage of their convictions. There was a time when the Association thought that a higher preliminary education was not only desirable but necessary, and that the time of study ought to be extended. My impression has been that if they had had the courage of stick to those two propositions, dental education would have been advanced and the interests of the colleges would have been advanced. The prospective students would have to come up to the standard the Association proposed to set for them.

I believe that I represent the only school that adheres to the higher standard and a four years' course. We have not suffered numerically; we have as large a class to-day as we ever had. The prospects are that next year's class will be larger than any other. We have a better class of students since we made our standard for entrance that of matriculation in the faculty of arts in a recognized university. We have been able to maintain that standard, and we shall continue to do so.

Other things being equal, the better the preliminary education, the better the man will be in his chosen calling. Of course, a preliminary education alone does not necessarily make a successful man, but given the other elements of success, a man with a better education will stand at the head of his profession.

I was a little sorry that the President threw cold water on the idea of a longer term of teaching. I do not think that it was quite a fair illustration to depict the result of a longer term than three sessions by referring to the perrennial students who hang around all institutions. In order to judge of the results of long-term teaching we must refer to the better members of the class, and not to the worst ones. If a school can make a good dentist in three years, it will be able to do better in four years, and our experience demonstrates this to a certainty.

So far as the curriculum in dentistry is concerned, I am going to suggest to our Board of Directors that they add to our fourth year quite an extensive course in English literature and composition. This would be an enormous advantage to the student in his professional career, and especially in his relations with other educated men. Such dentists would have a better command of the English language than most of them have to-day.

As to the text-books, we are all able to criticize them. They are not usually prepared to be used in connection with didactic teaching. They are intended to be entirely complete in themselves. There was a time when that was a necessity. When Harris' Principles and Practice was first issued, only a very small percentage of dentists took a college course. A text-book must cover, of necessity, the veriest detail of instruction. To-day a very small proportion of dental students do not take a college course, and text-books should be prepared with the understanding that they are to be used constantly in connection with didactic teaching, and for that purpose they may be condensed into a very small part of the bulk they now have.

One text-book that I have in mind which seems to be of the desired class, is the late Dr. Barret's Oral Pathology and Practice. It is concise, it covers the ground, it is expressed in admirable language, and seems to be an ideal text-book. If we had in the other subjects a text-book equal to this, we would be equipped very much better than we are to-day.

We are much better off in the matter of text-books in subjects not strictly dental. In physiology, chemistry, and so forth, we use books in common with those who teach in medical and scientific institutions, and we have better books. Some years ago I had a conversation with a representative of a publishing house, when I told him that I thought publishers had a snap, thinking that every student would want a copy of a certain book published by them. He told me that I was mistaken; that only a very small percentage of dental students buy any books at all. That was rather a surprise to me, but closer acquaintance with our students satisfied me that he was correct. Dental students have an anatomy, a physiology and a chemistry, but I venture to say that a considerable percentage of them go through school without any book on operative or prosthetic dentistry. Just how they can reconcile that with an intelligent conception of what is embraced in these studies, I do not know.

If we had text-books and not encyclopedias, students would buy them and use them very much to their own advantage as well as to the advantage of the teacher.

Attention has been called to the fact that the writing of text-books involves to a certain extent the sacrifice of life. The busy man writes at a time when he ought to be engaged in other pursuits in justice to his health. That is why we ought to be generous in our criticisms. These men are doing us a service at a very great sacrifice to themselves. It would be desirable not to have young men write text-books. They know too much. After ten or fifteen years of practice and observation they know enough, probably, to write a text-book that will cover the ground so as to be of real service to the student.

Dr. Edmund Noyes, Chicago.

"Ignorance is a want of knowledge, a want of judgment is stupidity. To know too much for his capacity makes a man not wiser, but more stupid." Pouring into the minds of raw students a great mass of information and opinions, most of which seems to them unrelated and some of it contradictory, is apt to make many of them stupid for a time and a few of them permanently. If the President's desire for greater brevity, conciseness and clearness in our text-books, and especially for a better preliminary education, is realized, it will go very far to prevent or mitigate the danger that the judgments of the students may be stupified by the great number of facts which they are expected not only to memorize, but to digest and assimilate.

The additional years of age bring with them corresponding maturity, and the last two years of high school bring a much greater proportionate result than the first two in mental discipline and the foundation of culture. The boy's capacity for knowledge is so much increased that he is likely to absorb successfully the information he is required to memorize in the dental school.

Moreover, a professional man ought to be a cultured gentleman. I will not disparage the culture value of professional studies, but unless the foundations of culture have been laid in his previous education it is entirely probable that a young man may go through his professional course and graduate successfully, and yet get out of it almost nothing of culture, if by that we mean the broader aspects of professional knowledge as related to life in general.

Dr. A. G. Friedrichs
New Orleans.

In this connection I am reminded of the saying, "Would that mine enemy would write a book." We have been dicsussing all these imperfections in text-books, but have failed to mention a remedy for this evil. After listening to these very distinguished gentlemen, I think that the only remedy is that we all write a book. There is not one of us who will agree with the neighbor, therefore our only hope and salvation is that each man write his own book.

Dr. G. V. Black,
Chicago.

I have been so unfortunate as to have written a few books. The man who writes his first book may possibly be excused on the ground that he did not know any better. The man who writes a second book is a fool, and the man who writes a third book ought to be shot. The writing of a book is a very uncertain task. It is very uncertain whether the writer himself will be pleased with the book, and probably it will displease a great many readers, if it should be fortunate enough to have many readers. And yet there are some singular things that occur in the writing of books.

I had this occur to me once. I was very busy at my work when I was conscious that someone had entered the room. I turned around and there was an elderly gentleman who inquired whether I was Dr. Black, the Doctor Black who wrote a book on the production of poisons by micro-organisms. I answered, Yes. He asked to shake my hand, saying he had come five hundred miles to do so. He grasped my hand, turned around, and walked out of my office, and I never knew anything more about him. While not many persons may have been interested in that book, it may have done a few some good. If so, well.

Most books have a few friends who have been benefited by the writer's thought, and in that they are valuable. Only a few books take hold of the minds of many people. We should not criticize too harshly the writers of books, and yet I do think that we have not produced as yet the ideal school-book. That is a thing of the future in dentistry, and we need school-books more perhaps than does any other profession. I am not finding fault with the detail that enters into our books; our practice is one of infinite detail, and unless the student arrives at that detail, he will certainly not be a very finished practitioner. I am of the opinion that very much of that detail should find its way into our books, where it can be referred to by the student. It is true that would make our text-books thin books, thin in the sense of the number of pages, the amount of text, and we would find them confined to a single phase of the subject of dentistry. This thing of a blanket book in dentistry is rapidly passing. We should have many books, and thin books. Each subject should have its own particular book, one that the student can stick in his pocket and take home with him. That is the book we need in dentistry.

The subject of operative dentistry should have several books, not one, taking up its different phases. That is my opinion, and I believe it will in the future prevail in the matter of text-books.

I do not know that I care to discuss the question of preliminary education. I agree with the proposition that other things being equal, the young man who enters the dental school with the best preliminary education will make the best dentist. But there is a limit to the preliminary education, and that limit is an ever-changeful one. A preliminary education that was sufficient forty years ago would not do at all to-day. What is our object? What must be the object of any profession? The benefit of the people. This is the only legitimate object of professional work. We must serve the people the best we can, and the best preliminary education is the one that will serve the people the best, although that will not be the highest education. We will always hail with delight the young man who comes to us with a higher preliminary education. The British Dental Association put before the Parliament a new bill which would exclude all men from the practice of dentistry who had not passed through a regular curriculum prescribed by the Association. The Bill was referred to a Committee. After several months of careful study of the subject, the Committee reported that they could not vote favorably on the Bill, because the dental colleges had proven themselves unable to produce enough dentists to serve the English people. Now, we must produce dentists enough to serve our people. Whenever we fail to do that, we are doing a wrong. They had better be served somewhat indifferently than not to be served at all. Of course, we can not make the character of this service too high, and fortunately we are in the position in this country to give the best service. Our people are more appreciative of dentistry than any other people on earth. Therefore, we ought not to make our requirements higher than what is required by our people. We have not overstepped the mark either in time or in preliminary education, and we seem to be in no danger of doing so. As the result of the investigation made in England, they have dropped one year from the curriculum, and to-day it stands three years instead of four. They must produce more educated dentists, even of a little lower grade, in order, to serve the people as they should be served, and also in order to educate the people so that they may make use of that service. These points are of value.

Dr. D. R. Stubblefield,
Nashville, Tenn.

This is the proudest moment of my professional life. I have dreamed a dream all the years of my professional life, and the ideal has ever been above me, and yet no man can ever be great who has not a great ideal. I have always looked up to the future with the hope that possibly some things of which I dreamed might partially be attained, but I have never seen a full gratification awaiting me and I never hope to see it. I do not want to find it, but I have had this ideal, that I might write an article that would not fall still-born, but would bring forth response and would set you to thinking. Each time I have appeared before you I have had the conviction that the highest achievement that I could possibly desire was to do that which would set you a-thinking.

Last year I deliberately laid a trap, but took no game. This year, if I have done nothing else, I have at least brought out a discussion that has filled me with pride; that has indicated that I have said something that has made others think, and if I have done that, I have done all that I expected to do.

The statement that an education does not make a man is true, but the want of an education handicaps a man. A man who can not utilize his education is over-educated. The education that does not qualify a man to do the best he is capable of is not an education.

They talk about an educated fool, which is merely a man who is top-heavy. He has too much put into him. He is suffering from an overloaded stomach and is starving to death. Education is to be measured by results. Now, if we can get a book which gives to the student that definiteness of mind which he is seeking, we shall have achieved the highest thing possible in text-books, a school-book in contradistinction to the so-called text-book.

I was not criticizing books; I was talking about ideal text-books, books which will give the average student the best opportunity to see clearly that which the teacher has been trying to picture to him. The mind that does not see clearly can not hope to achieve definitely, and anything that contributes to certainty of mind is an educational influence.

I thank you, gentlemen. My gratification can not be expressed in words. I am glad that you have approved of my effort.

TREATMENT OF ACCIDENTS OF ANESTHESIA.

BY HERMANN PRINZ, M.D., D.D.S., DENTAL DEPARTMENT, WASHINGTON UNIVERSITY, ST. LOUIS, MO.

The disturbances resulting from the administration of anesthetics which to a more or less degree involve the various functions and tissues of the body may conveniently be classified as those affecting first, the digestive apparatus, second, the circulation, third, the respiration and fourth, the nervous system. Disturbances of the digestive apparatus usually manifest themselves in two distinct varieties, in nausea and in vomiting. By nausea we understand that well-known sickening feeling accompanied by wretching and a desire to vomit. It is the direct result of reflex movements of the pharynx, esophagus and stomach and is most likely brought about by the irritating vapor of the anesthetic. It is primarily noticed in connection with the administration of chloroform, ether and ethyl bromide, rarely with ethyl chloride or nitrous oxide. Treatment is seldom called for, nature usually helps herself. If we wish to overcome the nauseating feeling by drug administration, small doses of spirits of peppermint or the valerian preparations are recommended, especially validol, a compound of menthol and valerianic acid is deservative of mentioning. Vomiting proper results from complicated conjoint movements of the diaphragm, of the stomach walls, and the glottis. It is naturally more often noticed in those cases where a full meal is taken shortly before the anesthetic is administered, it rarely occurs in laughing gas narcoses. Through vomiting, the stomach empties itself and except dieting for a short time, no further treatment is required. It is essential to clear the mouth and throat from all vomited matter as soon as possible to avoid obstruction of the air passages.

Disturbances of the circulation are eminently dangerous. While they can not be observed directly upon the organs of circulation or the blood itself, fortunately they manifest themselves externally to the trained eye by various color modifications—cyanosis or extreme pallor. Cyanosis is the expression of severe static hyperemia resulting from accumulation of venous blood, viz: a subcharge of carbonic acid. The blue color appears primarily upon the end organs of the body, viz.: the lips, cheeks, fingers, nose, etc. Cyanosis is always present in dyspnea and asphyxia. Lipothymia, or fainting, is a temporary inhibition of the functions of the brain resulting from the cerebral anemia usually accompanied by more or less complete inhibition of all senses. If the heart should stop completely, general collapse may result. A specific variety of collapse which is marked by the suddeness of complete heart failure is referred to as syncope. This syncope, when occurring in the early stages of administering a narcotic and accompanied by typical staring of enlarged or reduced pupils indicates idiosyncracy to the narcotic used. The treatment of the disturbances of circulation consists in applying mechanical and chemical means to bring about increased or renewed heart action. Artificial respiration and powerful rhythmical compression of the heart's region are essential. Stand on left side of patient, and with right thumb press powerfully into the region between the apex of the heart and the left wall of the sternum, the left hand should be placed over the thoracic region of the patient to steady the body and compression should be applied about a hundred times a minute. Slapping the face and chest of the patient with towels wrung out in cold water acts as an active reflex stimulant. Nelaton suggests lowering the head or complete inversion of the body to promote rapid flow of blood to the anemic brain. Both means produce excellent results. Stimulation by chemical agents consists of applying strong irritating substances to the nostrils in the early stages of collapse, such as ammonia, in the form of smelling salts or its various solutions, acetic ether, eau de cologne. As a powerful dilator of the peripheral vessels the vapors of amyl nitrite are exceedinglv useful by placing three to five drops of this drug upon a napkin and holding it before the nostrils for inhalation. Flushing of the face and an increase of the frequency of the pulse follows almost momentarily. For convenience sake, amyl nitrite may now be procrured in glass pearls holding from three to five drops. Nitroglycerine solution manifests a similar typical nitrite action, a 100ths of a drop in the form of a hypodermic tablet placed upon the tongue is a useful stimulant of the circulation. Perfect respiration is absolutely essential to aerate the blood in circular disturbances.

Disturbances of respiration are either mechanical or functional in their nature. To avoid possible mechanical obstruction during narcosis which may occlude the trachea, careful inspection of the oral cavity should always be resorted to before beginning to anesthetize. Artificial teeth, removable bridges, chewing gum, and ditto tobacco, and many other things may be looked for in the mouth. In extracting teeth, extreme care should be exercised to deposit the tooth in reality outside of the mouth. A tooth is liable to spring from the forceps or more often, when forced from an alveolus by the elevator, may fall backward and enter the trachea. To avoid such an occurrence the Carter's oral net spoon has been devised. If the slipped tooth can not be caught by the finger or the instrument, an effort should be made, in extreme cases only, to force the tooth into the gullet by pushing it backward and a little to the left, thus gaining entrance into the esophagus. Vomiting will promptly produce the tooth. In the early stages of anesthesia occasionally inhibition of respiration is produced by tonic spasms of the muscles of the tongue, thus forcing this organ against the soft palate and the posterior wall of the pharynx. This same phenomenon may occur during profound anesthesia in a patient assuming a recumbent position. To overcome the stenosis of the larynx, the lower jaw should be thrown forward by pressing against the two rami posteriorly. This movement is known as the Esmarsh (English) or Howard grip. A tongue forceps may be inserted and the tongue pulled forward or even piercing the tongue with a needle threaded with stout silk and applying rhythmical traction has been resorted to.

The typical organic impairments of respiration are known as apnea, dyspnea and asphyxia. The differentiation between these three forms of suffocation rests probably more with the severity of the disturbance than with the kind; they are primarily the result of a lesser or greater paresis of the respiratory centers. The supreme remedy is artificial respiration, viz.: an artificial means for the thorough ventilation of the blood and lungs replacing the narcotic with air until normal functions of the organ is established. One of the older methods of forcing air into the system is the mouth-to-mouth insufflation. To-day this method is abundant. The same is true of the bellows method. Artificial respiration may be applied by any of the known methods that serves its purpose well, provided the employed method is thoroughly understood. There is no need to enter into detail in this connection. The text-books furnish amply illustrated descriptions of these methods. Faradization of the diaphragm is sometimes useful, however, too much should not be expected from the electric current. A careful and quickly instituted artificial respiration is the alpha and omega of all methods of resuscitation. The proper use of the first minute is of more real value in the preservation of the extinguishing life than all the hours thereafter. No precious moments should be lost by rubbing the patient, applying smelling salts, or other secondary means. Artificial respiration may often be profitably continued for an hour or longer until fairly normal lung activity is established.

As far as medication is conecrned, the only drug that has proved to be of value in this connection is strychnia in full doses by means of hypodermic injections.

Nervous disturbances during or following anesthesia usually manifest themselves in two definite forms, in those affecting the physche proper and those unbalancing the motor centers. Physical excitement is a common occurrence in the preliminary stages of narcosis, hysterics and alcoholics furnish by far the largest contingent. Intense muscular exertion combined with clonic or tonic spasms frequently result in an increased pulse rate with more or less cyanosis and stertoreus respiration. If we possess an anamnetic clue in regard to existing hysteria or alcoholism, a hypodermic injection of morphine half an hour before beginning of the narcosis will materially lessen this preliminary excitement. Occasionally we meet with a patient who will awake from the anesthetic with apparent normal physical condition, but without perfect control of the sensorium. The patient remains for some minutes in a sort of lithargic sleep, which at times may reach a deep comotose state. Smelling salts held to the nostrils, cold water dashed in the face, loud talking or shaking will arouse the patient. Disturbances of the motor centers result in more or less severe spasms. Singultus, the ordinary hiccough, is often seen in the early stages of inhalation. Tremor of a single group of muscles or of the entire body is noticed more or less frequently after the taking of smaller quantities of the narcotic; similar tremors as a result of indulging in other narcotics such as tea, coffee or tobacco are noticed in those who are not habitues of these drugs. These muscle quivers are usually confined to the early stages of inhalation and are not dangerous. If they should occur after the anesthetic passes off, the strong will power of the patient materially assists in overcoming those tremors readily. Convulsions, combined with clonic or tonic spasms occur frequently under nitrous oxide anesthesia, much less under other narcotics. Care should be exercised so as to prevent the patient from hurting himself. The removal of the anesthetic quickly relieves the condition. Tetanus, the persistent contraction of voluntary muscles, is frequently seen in the early stages of anesthesia, less, however, when chloroform is used. Typical trismus, viz.: tonic spasms of the muscles, which are supplied by the fifth pair of nerves, especially those of mastication, is often very troublesome in dental anesthesia. As a precaution, a suitable mouth prop should always be put in place. Severe forms of tetanic convulsion by bending head and feet backward and known as opisthotonus, are also seen under anesthesia in the early stages; all this muscle disturbances rarely call for treatment, carefully watching of the patient so as to prevent hurting himself, however, is indicated.

In dental literature reference is frequently made to "shock from the anesthetic." By shock proper is meant the depression resulting from an injury or an operation and we are inclined to believe that these "shock stories" of anesthesia can be suitably placed under one or the other of the various disturbances within the four divisions of anesthesia sequences if proper diagnosis is made.

The various statistical tables regarding the death rate of each individual narcotic are of relative value only. If, for example, a given table shows that one out of every three thousand chloroform narcosis is fatal, a careful inquiry into the real condition of this one fatality should be made and compared to the 2999 successful administrations. A single handed operation, performed under chloroform in a dirty box car by the aid of a smoky lantern should not be placed side by side for comparison with a narcosis made by a trained anesthetist in a well-appointed hospital.

A committee appointed by the Central Society of German Dentists has prepared careful statistics of dental narcoses from reports by its members, covering a period of three years (1902 to 1905), with the following results:

Chloroform	1	death in	35,342
Ethyl bromide	1	“	112,001
Nitrous oxide gas	0	“	61,108
Ethyl chloride	0	“	2,523

The committee, through its chairman, Dr. Lipschitz, commend as follows on the statistics: These numbers, of course, are not to be regarded as absolutely free from criticism. First, we have to take into consideration that especially those colleagues, who have had a death from an anesthetic in their own practice, are prone to withhold their report from the committee and second, the reports of former years are frequently only guesses. Besides, mistakes may have been made in filling out the tabulated record sheets.

Dangerous sequences of local anesthesia are confined to the untoward physiological effects of cocaine and its substitutes and to the dangers of the refrigerating agents. Cocaine and its substitutes may be regarded as being similar in their poisonous results. No true antidote exists which will neutralize the cocaine poison, consequently the treatment is purely symptomatic. To overcome cerebral anemia, amyl nitrite is applied together with recumbent position or even complete inversion. Artificial respiration is essenf tial in severe collapse, while as a heart stimulant, an injection o- comphorated oil is useful. The lighter disturbances may be treated with strong coffee or caffeine, given by the mouth. Since we have a clear understanding of the action of adrenalin upon the circulation, its application in connection with cocaine has materially mitigated the dangers of the latter drug.

Ethyl chloride and drugs of a similar nature which are applied for the purpose of reducing the temperature of the tissues and thus stun the sensation may produce local gangrene by "over-freezing," viz.: the blood supply is cut off for too long a period. Great care should be exercised in the presence of an open flame, as the compounds of this group are highly inflammable.

For the purpose of readily meeting unexpected side effects of anesthetics, every practitioner should provide himself, aside from a complete annomendarium, with a stock of emergency drugs, placed in an easily accessible compartment of his medicine chest, consisting of:

Hypodermic tablets of strychnine sulphate $\frac{1}{30}$ grain,
Hypodermic tablets of nitroglycerine $\frac{1}{100}$ grain,
Amyl nitrite in 5-drop pearls,
Validol,
Aromatic spirits of ammonia,

Camphorated oil,
Smelling salts,
Whiskey and a
Hypodermic syringe in good working order.

In my communication on the teaching of anesthesia which was read at the last year's meeting of this august body, I stated that "A warning note should be sounded to be especially careful in experimenting with so-salled "new and harmless" anesthetic compounds upon our own clientele, because it should always be remembered that, no matter what the nature of the anesthetic may be, if it is substituted in the organism for an element indispensable to life, it must eventually kill." I can only repeat the same warning and add that this year (1906) we have to report one known death occurring under anestheting with one of these compounds. The recent improvements in perfecting the methods of local anesthesia have resulted in placing at our disposal a relatively safe and effective means to combat pain which is amply sufficient in the majority of cases as they occur in dental practice. The rational principle of local anesthesia, of which I have written elsewhere, is deservative of your consideration. A clearer study of the subject has convinced me that it furnishes us with a means for materially reducing and often completely nullifying the pain of dental operations without the aid of a general anesthetic.

Discussion.

Dr. H. M. Semans, Columbus, Ohio.

A traveling man tells me that there is a woeful lack of preparation for emergencies in most offices in our part of the country where general anesthetics, such as nitrous-oxide, and somnoform are given. The comparative safety of the one, and the exploited safety of the other, has given the operator a feeling of security of such a nature that I doubt if many of them would know the proper remedies, let alone knowing what the disturbing symptom might indicate. An hypodermic syringe he has, but rarely very handy, whiskey, possibly, and smelling salts somewhere roundabouts. I fear this carelessness of human life is not confined to our locality alone, but is common everywhere. Our commercial houses desire to sell their goods and apparatus not to frighten the buyer by suggesting what might happen. It behooves us, as teachers, to impress upon the minds of our students the necessity of both, a thorough knowledge of what the anesthetic he uses can do, and how to make use of a careful preparation to offset these results.

A year or so ago when I was teaching Anesthesia, a dentist of many years practice approached me and remarked that he thought it strange that a teacher of Anesthesia should advise all his students against using general anesthesia in dental practice. I objected to his statement, and I soon found he was so impressed by one of our students who had informed him that I spent a good part of my time in warning my class against carelessness, and had advised them to let all general anesthetics alone, unless there was present in the operator's mind the fact that he held the patient's life, for those few minutes, in his hands, and that the only security of feeling that he should have should be a supreme knowledge of what he could do if necessary, should the necessity arise; whereas, if he experienced a blasé feeling of how easy it is, or no feeling on the subject at all, he had better dump his stuff out of the back window.

I listened to Dr. Prinz' paper last year with pleasure, and am glad he has followed up so good a paper with another on the same general subject. There is a note of warning all the way through it, so much so that the reading of it would frighten the careless man and make the careful one look even more to his patient's safety. It is a lamentable fact that the medical profession in general object to our using ether and chloroform, not only because we have something safer and quicker at hand, but because we do our general anesthesia along with our other office routine work, and without proper preparation. How many of our office chairs are built to give ether or chloroform? I know a physician who never touches a patient on his rounds without first saying: "A little warm water, soap and towel, please," putting it on, perhaps, but that is the trouble with our profession, most of them do not put it on. I am not referring now to our splendid class of anesthesia specialists, but to the all-kinds-of-work dentist, broadcast. Their life is a hard-working, hurried one, and where they are giving and using anesthetics, it is done so with many in rather a careless manner. Take cocaine for instance, many use it with absolutely no thought of danger, and with but little thought of the amount of proportion they are using.

All our students should be warned as to the necessity for providing themselves with an emergency drug outfit; not but that they receive such instruction in the regular course of lectures in anesthesia. In clinic or infirmary, wherever an anesthesia, local of general, is about to be administered, all the necessary emergency drugs and means that can be used should be placed in full view of the students present, with comments from the demonstrator or administerer of the anesthesia as to what each is for; this can be done before the patient is brought in. I believe in this way we firmly fix in their minds the necessity for care, as well as what means for a prevention of serious results they must have at hand. It might be well to have framed and hung on the wall, the various articles used and the reasons why.

It is a good plan to have several of the students close at hand; one holding the hypodermic syringe ready for use, another with the box of amyl nitrite, pearls, etc. Thus we make the best use of our extracting under anesthesia, and do not turn it into a hurried, quickly-to-be-gotten-over affair. Allow the students to go through the various posts of assisting to actual administrating, always under the eagle eye of a competent man; by so doing we will educate them to the seriousness of the occasion, as well as to proper skilfulness.

Dr. Thomas L. Gilmer, Chicago. I wish to congratulate the essayist on his very excellent paper. Some time ago Dr. Edmund Noyes of this city, made inquiry from the various schools of this country and learned that there were only a few that had any regular course in anesthesia. This was a great surprise to many of us, since it is one of the things that ought to be taught in every dental school, because dentists administer anesthetics quite as often, if not more frequently, than does the average general practitioner of medicine. If this is true, then he should have specific training in this work.

It seems to me that if we give an anesthetic in the office, it should be nitrous oxide gas; all other anesthetics should be given in the hospital for surgery, where the facilities are better than are usually found in the private office. A general anesthetic, except nitrous oxide, should always be given by a professional anesthetist. Most of us are not qualified of judging as to whether a patient should have this or that anesthetic, or any anesthetic at all. One giving the anesthetic should know how to give it, and when to give it; he should also devote his whole attention to the patient when giving it. We should never forget that when one is fully anesthetized, but little is required to push him over into eternity.

I quite agree with Dr. Prinz that we should have all of the antidotes necessary close at hand. I do not believe that we should give any anesthetic, not even nitrous oxide gas, without having everything ready that may be necessary to resuscitate the patient in case of accident. I would like to add to his list of drugs digitalin. It is an excellent heart stimulant. If ether or chloroform are being used, I would add in conjunction oxygen gas, and a window close by, from which the patient could draw if needed a fresh supply of pure air, uncontaminated by the ether or chloroform vapor.

When I taught anesthesia I tried to impress on the students that they should never administer an anesthetic without the presence of a third person, for three reasons: First, in case the patient becomes unmanageable and attacks the operator he would have assistance; second, in case of collapse the third person could help to restore the patient, and a third, to protect him from suspicion should the patient be a woman, did she have hallucinations incriminating him.

Dr. Prinz stated that the first effect of an anesthetic is on the digestive apparatus, second on the circulation, third on the respiration and fourth on the nerves. I may not be sufficiently informed on this subject, but it seems to me that this is incorrect. I would say that an anesthetic first affects the respiration, second circulation; third the nerves, and fourth, the digestive apparatus. The Doctor did not speak of one method of reviving the patient in collapse which I have found very valuable, and that is dilatation of the rectum. I quite agree with him in reversing the patient. A little shaking of the patient's body while reversed will also tend to improve his condition.

The eye should be watched closely, because it often signals danger when nothing else positively indicates it. If the pupil is much dilated, look out!

There is nothing from which we can get greater benefit in reestablishing respiration than by traction on the tongue. The tongue may become paralyzed, fall back, suffocating the patient. In infant narcosis it is always my custom early in anesthesia to pass a large needle through the tongue, threaded with braided silk, by means of which I can make traction with the tongue in case of accident, besides by it we may hold the tongue out of the way in certain operations in the mouth. The least possible quantity of an anesthetic necessary is the best. For young children, I prefer chloroform. In order to give the smallest possible quantity of chloroform it is desirable to use some apparatus, such as the Souchem vaporizer, by which the chloroform may be vaporized. By this method the smallest quantity may be given, sufficient to keep the patient asleep, and no more. If the patient is allowed to go under and come out repeatedly, as is necessary by the ordinary method when operating on the mouth, very much more of the anesthetic is used than is desirable and the operation unduly prolonged.

The patient should be examined carefully before he is anesthetized. This examination should determine the choice of the anesthetic best suited. The patient should always be placed in the recumbent position, excepting possibly when nitrous oxide is employed.

I do not believe in experimenting with the mixed anesthetics. I believe it is wrong to teach that the administration of such anesthetics as somnoform, or any anesthetic for that, is of no more danger than drinking a glass of water. It is possible that in time somnoform may be shown to be a good and safe anestethic, but yet we can not truthfully say so. As to cocaine, I think it is a God-send. I think we have been unnecessarily fearful of it. There is no doubt that it is a dangerous drug when carelessly used. I have employed it daily for years, both in clinical and in my private practice, and I have never had serious results from its use. If the field of operation is carefully sterilized, and if we use a clean hypodermic, and if we give a definite safe quantity, it seems to me that there is little danger in its use, especially when it is combined with a control such as atropine, morphine or adrenalin. I try to impress on students the importance of using cocaine not in per cent. solution, but in definite amounts, let it be an eighth or a quarter of a grain, as the case may be, but always in definite parts of a grain.

Dr. A. G. Friedrichs,
New Orleans, La.

The discussion has covered so much ground that it leaves little for me to say. I do not believe that the dental student should be encouraged to use either chloroform or ether. Everyone who has had any experience with these drugs appreciates the dagner of their use, and they also appreciate that great skill as well as experience is required in their administration. Only the experienced anesthetist ought to give either one of these agents. No dental or medical school can give any man that experience which comes only from usage. In fact, there are so many things in connection with anestheisa that must be considered as matters of detail, that no amount of teaching can give. It requires experience.

We must know what the pulse means, and what the dilatation of the pupil means, and many other minor things. The Doctor also talked about nausea and vomiting resulting from the use of anesthetics. A first class anesthetist would feel guilty if nausea and vomiting occurred.

The dental student should be trained in such a way that in the event of an accident during an anesthesia he will be able to assist the anesthetist in resuscitating the patient. Every dental office should be equipped with the agents necessary to combat any accident that may occur during anesthesia. I remember an instance in my city where a man was held up for damages in a case of fracture of the jaw because he did not use the X-ray. We are supposed to use everything not only in diagnosis, but in the treatment of our patients, and the same thing applies to the accidents that occur during anesthesia. How few dental offices are equipped with agents that must be used in an emergency?

In regard to the use of these other anesthetics, that we know nothing about, I agree fully with Dr. Gilmer. Take somnoform, for instance. We know that some of its ingredients have killed patients; therefore, a combination of them does not make the product any better. I have used many anesthetics and have given them for a period of years. That is why I am emphatic on this subject, and that is why I realize what are the dangers of anesthesia. No surgeon would want some tyro to give an anesthetic for him. He hunts up an experienced anesthetist. He can not be annoyed by having his attention called to the patient's condition while he is operating. I think the day has come when we must have specialists in anesthesia. There is no use putting the notion in our students' heads that they can give anesthetics properly. Do not inflate them with the idea that they are good anesthetists. Teach the student all about the dangers that surround him, and tell him what to do in case of accident, and you have done your duty.

Dr. H. D. Peterson, Chicago. I agree with Dr. Friedrichs on several points, and on others I disagree with him. I believe that a student can be taught to be an anesthetist just as well as he can be taught to be a diagnostician or a surgeon. A few years ago it was thought that anybody could give an anesthetic. This is a matter of considerable importance, especially in the rural districts, where it is not always possible to secure the services of an expert anesthetist. If the student were taught to watch the pulse, the respiration and the pupils, he would have a definite basis on which to work, and he would be better able to anesthetize than if he did not have that teaching. A patient who is being anesthetized is pretty close to the brink of the grave, and I do not believe that it is right for anyone to subject that patient to unnecessary dangers. The idea is becoming more and more prevalent among medical men that he who gives an anesthetic should be trained. I have given a good many anesthetics, but even to-day I do not give an anesthetic without a good deal of fear and trembling, especiallly when the patient is aged or is an infant. The only man who is not afraid of an anesthetic is he who knows nothing about it. I have noticed in the hospital, before anesthesia was taught, when a new interne is asked to give an anesthetic he soaks the cone, puts it on the face, and then watches the operation. That is a cause of very many accidents. The anesthetist should devote all his time to the patient.

Another point which proves my statement is that there is about one hundred per cent more ether used by the interne in the first six months of his service than afterward, when he learns of its dangers. In the hospital with which I am connected chloroform is looked on as a very dangerous drug. It is wrong to give ether or chloroform without regard to the patient's condition, as there are many things which would indicate which drug should be used, and which one should not be used.

If the student is taught to examine the heart and lungs and kidneys, he will get a good indication as to what drug to use. Ether may be used safely when chloroform would be conrtaindicated, and vice versa. The dental student should not use a general anesthetic, any more so than the medical student who is inexperienced. I agree with Dr. Gilmer that there is not enough teaching of anesthesia, either in medical or dental schools. If more teaching of anesthesia were done, there would be fewer fatalities.

Dr. Truman W. Brophy, Chicago. The preparation of the patient is one of the most essential steps in the administration of any anesthetic, and that is where the difficulty lies in general practice, as patients come for operation without having had proper preparation. It is not a good plan to administer an anesthetic without having the patient properly prepared. Oftentimes the lack of such preparation leads the anesthetist into trouble.

Recently a great deal has been said regarding the administration of chloroform and ether in the work that is being done by the Mayos, who are attracting the attention of medical men all over the world. They have been using for some time the drop method of administration of ether and chloroform.

The essayist has pointed out that the danger in anesthesia is in the early stage. The patient is excited or he may cry out and inhale such tremendous quantities of vapor that he is overwhelmed. If the anesthetic could be administered during the sleeping hours of children, so much the better, because then chloroform could be given without having the child in that stage of excitement which is always associated with more or less danger.

The question of the action of chloroform on the heart and of ether on the kidneys must also be considered. I hold that a man to be a good anesthetist must be capapable of making a physical diagnosis, and note the conditions that contraindicate the use of these agents. He certainly would not administer chloroform to one who has a feeble heart, or give ether to a patient suffering from a kidney disease.

The value of the method administering chloroform or ether, as mentioned by Dr. Gilmer, is the best. You may use a mask at the commencement of the anesthesia, and then by use of the vapor you may carry just so much in with the proper admixture of air. The patient is not overwhelmed by the tremendous volume of the vapor. With this method the patient is kept steadily under the influence of the anesthetic, you can see the condition of the face, the eye, skin and lips, and note immediately any change that would excite apprehension. Restorative measures should be resorted to immediately before the patient is in a dangerous state.

Of great value is the pulling out of the tongue. It insures more perfect respiration. For this purpose I use a little instrument given me by Dr. Griffiths, of Cambridge, England. It is made in the shape of a hawk's bill, and pierces the tongue without lacerating it.

Of great value in the resuscitation of a patient is the aromatic spirits of ammonia. I look on that as one of the most valuable agents at my command. I always use it. One dram of the aromatic spirits to one ounce of water is placed in a glass, and if respiration is bad or the face becomes pallid, I drop a few drops of the mixture into the pharynx with a medicine dropper, and the result is instantaneous. The vapor is taken into the lungs and the circulation is stimulated.

Another step of value is the shaking of the patient, which Dr. Prinz mentioned. The patient is held with the feet up and the head down, thus stimulating the nerve centers of the brain by the excess of blood which flows to it and this position forces all the of abdominal viscera against the diaphragm, thus helping the action of the lungs, and the patient is more quickly revived than in any other way. The head-down position is valuable; the shaking of the patient adds to its value.

The question of local anesthesia I will not discuss, for I rarely use it. I have never met the man who can tell me what is the minimum dose of cocaine that is not toxic. When I use it, I feel as the last speaker stated, that we are treading on dangerous ground. We all feel this, and the older we get the more we feel it. There is always the uncertainty as to whether the patient will recover.

TEACHING MATERIA MEDICA, PHARMACOLOGY AND THERAPEUTICS.

BY J. P. BUCKLEY, PH.G., D.D.S., CHICAGO, ILL.

In teaching materia medica, pharmacology and therapeutics, as in the teaching of all other subjects, it should be the aim of the teacher to make the subject matter as thoroughly interesting and practical as possible. How best to accomplish this end in our dental colleges is the question which your program committee has asked me to discuss. It gives me pleasure to make this effort before this body, which I consider the most critical in our profession; for I am anxious to know the shortcomings of my method of teaching these subjects that I may give the students under my care a thorough and practical course.

In the first place let me say that in order to successfully teach any subject, the teacher must be relieved from any conscious effort in learning the subject, that he may put his whole attention to the student's process of learning it. This suggests at once the necessity for the teacher's familiarity with the subject matter of instruction. There is an old axiom which says: "Man's highest happiness comes from the consciousness of realizing ideals." If this be true, the teacher of any subject can find no true pleasure in his work without the consciousness of realizing some end set up in the life of the student. According to Arnold Tompkins, author of "The Science of Discourse," teaching is the process by which one mind, from set purpose, produces the life unfolding process of another.

The main essential, then, for every successful teacher is to have an aim in teaching, or the teacher's ideal. It matters not who the teacher is, or to whom he is imparting knowledge, this general pedagogic principle holds true. After the teacher has formed the ideal of the work he has to do, the method of teaching should command his attention. By method here is meant, "The way, the process, the movement by which some end set up is realized." So far as the aim in teaching is concerned, there can no be difference of opinion. It is the desire of every teacher, I am sure, during the short time the student is under his care, not to deaden his natural appetite for knowledge; but to stimulate in him a lifelong tendency to study. The method by which this aim can best be realized will depend largely upon the individual characteristics of the teacher.

Before calling your attention to the writer's method of presenting these subjects, I am going to take the liberty of defining, according to modern thought, the terms included in the title of my paper—not that I consider it necessary to enlighten this body of men as to the meaning of these terms, but in order that you may know at the outset my reasons for teaching these correlated subjects in the manner which I do.

MATERIA MEDICA was formerly used in a restricted sense, meaning, as the word implies, the materials or substances used in medicine. This term to-day is used in a broader sense and means the science which treats of drugs. In other words, materia medica is a HISTORY of drugs and remedies.

The term PHARMACOLOGY was derived from two Greek words-pharmacon, drug, and logos, science—meaning the science of drugs. This is what we understand by the term materia medica, pharmacology being restricted to that part of materia medica which treats of the ACTIONS of drugs and remedies upon the tissues, organs and functions of the body.

THERAPEUTICS is the science which treats of the APPLICATION of drugs and remedies to the treatment of disease.

The teaching of materia medica proper, in our dental colleges, I hold should begin in the freshmen year. The general text-books on the subject can be used, and the subject taught by means of recitations, conducted by competent quiz-masters. To be a good quiz-master requires much more tact and ability than to be a good lecturer. It is here that I desire to emphasize the fact that skill in giving directions and in asking questions arises out of the readiness with which the teacher, by insight and sometimes sympathy, finds his way into the mind of the student in his effort to learn. Written questions on the subject avail little; and if used as a guide should not be followed closely, for it is the quick and true insight of the quiz-master into the essential movement of the learner's mind that enables him to select the right kind of a question to be asked at a certain time. In all cases where we have text-books from which lessons can be assigned, the best results in teaching can be obtained by the recitation method. If the writer was prone to criticize the general methods of teaching most subjects in our colleges, he would say that too much lecturing and not enough quizzing was done. This is largely because of the lack of proper text-books on the various subjects.

The course in materia medica in the first year should include a study of definitions, terms and abbreviations used; metrology so far as it relates to dentistry; the administration of medicines, together with a study of the drugs used in dental practice; their habitat, source, brief description, constituents, properties, preparations, dose, etc. The crude drug, together with one or two useful preparations, should be exhibited during the recitations. If there is any part of the entire course in materia medica, pharmacology and therapeutics that is liable to prove uninteresting to the dental student, it is the general materia medica taught in the first year. The attention which is given to this subject depends upon the teacher's ability to interest the student. The student's interest must be aroused and his attention held. When a student feels that the subject before him stands as a means between his present, real self and his future, ideal self, he is always interested in that subject. All that is necessary to hold the attention of the class is to show them that that which is being taught has a direct bearing upon their future life. To do this here, as the student is learning the abstract history of the various drugs, the teacher can mention their dental uses. This is something which the general text-books on materia medica do not give; it is something, then, which the student did not study, and will prove to be a means by which the INTEREST in the subject is greatly stimulated.

The course in the Junior year first includes a brief study of the Pharmacopeia. A familiarity with this authoritative work is of the utmost importance, and the student should learn the principal changes and additions in the last edition. The art of preparing medicine should receive some attention, for the writer knows of no better way of illustrating the properties, characteristics, and, to an extent, the application of drugs and remedies, than to study, briefly at least, the art of pharmacy. By this means the student becomes acquainted with many practical pharmaceutic facts which can not be learned and appreciated in any other way.

The pharmaceutical preparations should receive special attention in this year. Nealry all of the text-books on materia medica take up and consider the pharmaceutical preparations alphabetically. This is a serious mistake, in my judgment, and causes much confusion in the mind of the student. It is possible to classify all the preparations according to a difinite system by which means they are easily learned. The classification which the writer follows is found on the accompanying chart. I consider no time lost in giving our dental students a practical knowledge of the pharmaceutical preparations. I fully realize that it is desirable and in a sense important for the student to know, for instance, in connection with aconite, that it is perennial, a herbaceous plant which grows abundantly in the mountain forest of France, Switzerland, Germany and the northwestern part of North America; that both the leaves and root are used; that its active principle is a very poisonous alkaloid (aconitine), etc.; but it is far more important that the dental student should know that the Pharmacopeia recognizes several preparations of aconite, the most useful of which, to us as dentists, is the tincture that the product formerly was 35 per cent in strength, but that the United States Pharmacopeia of 1900 reduced the strength to 10 per cent; that this preparation is an important ingredient in many liniments used in the local treatment of facial neuralgia and pericementitis.

Prescription writing, including incompatibility, should be taught in the junior year in my opinion, immediately following the teaching of Pharmacopeia and pharmaceutical preparations. This subject should receive the dignity which it deserves in a dental course. There is only one way to learn to be a good prescription writer, and that is to practice, practice, practice. Therefore, after teaching the essentials of prescription writing, the teacher should see that the student continues to practice the art until his graduation, for by this means only can the spirit be inculcated and, in so far as it relates to the dental practice, an exposition be given of physical and chemical laws and their practical application in pharmacy and therapeutics. One of the real blots upon the fair escutcheon of dentistry today is the fact that dentists generally can not properly write prescriptions, and, therefore, feel compelled to rely chiefly on proprietary remedies in their practice. This is sadly to be regretted; and the best means of checking this far too rapid influx of proprietary remedies—many of which are of doubtful composition and questionable therapeutic value—is to give our students, the future practitioners of dentistry, a practical knowledge of materia medica and pharmacology. By your teaching lead them to see and to appreciate that what we need in dentistry more than proprietary remedies is an intimate knowledge of the Pharmacopeia and of the pharmaceutical preparations therein recognized; for in the many official waters, liquors, spirits, syrups, elixirs, liniments, tinctures, fluid extracts, ointments, powders, pills, etc., etc., or a combination of two or more, can be found the counterpart, or better, of almost every proprietary remedy on the market to-day. I do not wish it understood that I object to the use of properly compounded proprietary remedies, the formula for which is given; but I do seriously object to the use of any secret-formula preparation. I do not blame the concerns who persist in manufacturing secret-formula preparations; they are purely commercial concerns and manufacture only what they can readily sell. Neither can I justly blame dental practitioners for using such nostrums, who, while in college, fail to receive practical instruction in these important subjects. I place the responsibility, gentlemen, where it rightfully belongs—upon the dental teachers whose duty it was and is to properly instruct our students. These teachers, however, find it difficult to get the students to realize the danger in using these preparations when they read the glaring testimonials so freely given by prominent dentists, many of whom are dental teachers. As an individual teacher, I join with other teachers of materia medica, pharmacology and therapeutics, in asking the support of all our dental teachers in correcting this evil. We promise to do our full duty; but we want your co-operation and support.

In the writer's course, by a combination of lecturing and quizzing, the foregoing subjects are covered by the holidays. The remainder of the Junior year is devoted largely to a study of PHARMACOLOGY, i. e., the actions of drugs and remedies upon the tissues, organs and functions of the body. However, those subjects previously taught are constantly reviewed by practice work. By this time the student should be familiar with the various drugs and important preparations. He should be able also to prescribe for remedies; and now he is ready to know how the remedy acts when applied to a diseased condition.

The tendency in medicine and also in dentistry to-day is to rid the professions of much of the empiricism of the past and to place the treatment of all diseased conditions upon a rational basis. To be able to do this we must know the action of the remedies employed in both health and disease. This course includes a study of the action and dental uses of such classes of drugs as counter-irritants, escharotics, hemostatics, antiseptics, disinfectants, local and general anesthetics, hypnotics, sedatives, stimulants and tonics. Poisons and their chemical and physiological antidotes or antagonists are emphasized. For this part of the course I follow quite closely "Long's Dental Materia Medica," emphasizing, the pharmacology and dental use more fully where necessary.

In the Senior year practical dental therapeutics is taught, and inasmuch as there is no text-book on this subject which can be folowed with profit and satisfaction, the course at present is taught by means of lectures followed by quizzes. One lecture a week on practical therapeutics is given. The lecture is supplemented by experiments and demonstrations. The teacher here should endeavor to eliminate from the course all obsolete methods and devote the entire time to a consideration of the most recent and successful methods of treating the various diseased conditions of the oral cavitiy. There is no department of dentistry that has been more thoroughly revolutionized and changed in the last few years than that of dental therapeutics.

The course in therapeutics, like the course in the two preceding years, should be graded and systematized throughout. In the Freshman and Junior years, general MATERIA MEDICA and PHARMACOLOGY were the subjects considered. To stimulate the interests of the student, therapeutics, or the dental use or application of the drug or remedy was incidentally mentioned. Now, in the Senior year, the aim is to give the student a practical knowledge of treating diseased dental conditions, and in doing this the materia medica and pharmacology, previously studied, should be incidentally reviewed. By this means the student's knowledge of these subjects is kept in mind.

There is one thing that should be insisted upon by the professor of therapeutics, and that is the methods of treatment taught didactically in the lecture-room, be put to practical use in the Infirmary. If this is impossible because of the impracticability of the methods taught, the professor should have the welfare of the student sufficiently at heart to resign his position, for only practical methods should be taught. I think it essential that the professor of this important department be a man engaged in private practice and not one devoting his entire time to college work. The head of the department should spend at least one-half day each week in the Infirmary demonstrating clinical therapeutics. By this means he comes in close contact with the student and can observe the progress made. A record should be kept of each student's work. The student should be required to study carefully each case presenting for treatment, note all the pathologic conditions, suggest the remedies to be used to the best advantage and the method of applying the same. Wherever indicated, a practical prescription should be written by the student and O. K.d by the professor or demonstrator in charge, for a mouth wash or other remedies to be used by the patient while under treatment.

It will be noticed that I have not discussed in connection with the teaching of therapeutics, the teaching of special pathology. In the college with which I am associated this subject is taught under another Chair. The teaching of special pathology and therapeutics should go hand in hand. By this I do not mean that the two subjects should be taught by the same teacher. This may be a convenience perhaps, but it is not a necessity. It is essential however, that there be a harmonious relation in the presentation of the subjects; for to properly recognize a pathologic condition, to know what drug or remedy when administered or applied will act the most favorably, and to have that drug or remedy at hand in a convenient form are three essentials upon which all successful therapeutics must stand.

In discussing this question, I have endeavorored to mention those subjects which, in my opinion, should be taught to our dental students; and, in a general way, how I teach them. I have avoided going into technical details, realizing that a method of teaching, in my hands, may be successful, while with another it may be an absolute failure. Each teacher must first have an ideal and then he must work out for himself, according to his individual characteristics, the process by which that ideal can be realized in the life of the student.

In closing, I desire to acknowledge my indebtedness for many of the general pedagogic truths in this paper, to a book on "Philosophy of Teaching," by Arnold Thompkins, which it was my good fortune to study while engaged in teaching in the district schools of the State of Indiana.

Discussion.

Dr. G. W. Cook,
Chicago.

The paper that we have just heard is one that is charactesistic of its author, full of interest and suggestiveness upon the subject under discussion. There are no special points that one can take any exception to, so I can do no more than briefly touch upon a few points that have been brought up by the essayist, with a hope that it may emphasize certain features that are extremely lax in our dental college teaching.

First, I must say that definitions as defined by the essayist are extremely important. However I might say in the beginning that I question if the essayist has not pedigogically broadened the scope of materia medica. It is a term that was formally used and is still used by some to designate the chemical substances, pure or otherwise, used in medicine for the cure of disease. As a medical term it has its place to designate the substance used in medicine, but really has nothing to do with the science of medicine. It may be said in this connection that pharmacology is the term now generaly used in a broader and more scientific way than the preparation of drugs.

We study and teach the three subjects which have been classified by the essayist for one purpose only, and that is with a hope that we can assist nature when the physiological forces of the cells' tissues and organs of the body are diverted from a normal functional activity to an abnormal one. Then the question arises, upon what particular points should we lay the greatest stress? My opinion is that a student should be trained in the science which treats of the actions of drugs and remedies for the relief of pain and cure of disease. That can only be accomplished when the subject is presented from purely a physiological and chemical standpoint (with inductive method), and there is no way of fixing this on the mind of the student except that it be presented to him by demonstrations and clinical association with the diseased conditions as they present themselves in daily practice.

The essayist has laid some stress upon the fact that practical application of a subject must constantly be kept in the foreground. I believe if we study the word practical and think of the routine work of the average dental student, we will find that all of our training is too much in the line of practical, instead of taking the philosophy that underlies the fundamental of all science as presented in technical schools to the student, the hypothesis upon which we can reason the why that we teach certain subjects. One of the most distinguished geologists of this country has said, "On teaching scientific subjects one of the mistakes of scientific education is because we never have a hypothesis." We put students, for instance, in chemistry to writing equations before they ever become familiar with the laws that govern chemical equations. So it is students are constantly instructed in the treatment of disease without even knowing the normal structure of function of the body, say nothing of being familiar with the causes and processes of pathological changes in the body—thus empiricism.

Persons teaching the subject of materia medica, pharmacology and therapeutics, in our dental schools are, as a rule, grossly ignorant of what constitutes scientific physiology or chemical or physical means of determining disease processes. Victor C. Vaughn, of the University of Michigan, has said that any man can be made a good teacher if he knows his subject well and is familiar with the collateral sciences of the subject under consideration. Things taught by rote do not make a profound impression on the student.

The essayist has laid stress on the scientific side of his subject and the importance of the same in the dental curriculum. Let us for a moment see, what is science? Science is a perfect embodiment of truth and a way of getting at the truth, and if we study the sciences as presented in the ordinary way it impresses the mind with a nature of evidence with the labors and precautions necessary to prove the truth. It is the grand corrective of lax methods and means of formulating mental processes whereby the mind can discriminate and form judgment. There is no better way to demonstrate reflex action of the spinal cord than the administration to an animal strychnine in one-twelfth of a grain, and observe all the phenomena that take place in the animal during the effects of the drug. Last year in our school Dr. C. E. Jones instigated a course of training for students, that if followed out to its logical conclusion, it would be of more value than all the professors or quiz masters that you could put at their disposal. But this takes men of scientific training.

It is quite impossible to secure any pràctical end in this world without observing the natural conditions. We must estimate the force of a current in order to build a rampart that will stand. We must know the motive of a student's mind before we can secure his attention. In proportion to our knowledge and regard for the truth of our knowledge, we must know the means of ascertaining truths. It is our power over the materials that come into our every day practice that will make us good dentists. The greatest test of our knowledge is the test of practical application. To memorize facts for the passing of an examination is not an education any more than the memorizing of a large list of telephone numbers.

The Doctor says that dentists are poor prescription writers. This may be said to be true of physicians as well. For that reason largely we may account for the physician as well as dentist choosing a proprietary remedy in the practice of his calling.

The experimental sciences of to-day cover a very large field of phenomenon, and the understanding of them enable us to penetrate into many of the secret workings of the natural world; and the gratification of enlightening the curiosity afforded by them is among the first pleasures that we receive from scientific study. Dr. Buckley has given us the foregoing sketch comprising a field of theoretical knowledge. Those sciences mentioned in his paper embrace in a very complete and systematic manner a large number of natural phenomena. They should embrace the most scientific methods and spirit in the greatest perfection in order to impart the greatest amount of accurate information.

Whatever scientific culture can do or may do should be embraced in the curriculum of our schools and there rigidly enforced. The educational forces at work in our dental colleges should not be allowed to drag in the manner that they are on such subjects as presented by our essayist. We must study science with all true earnestness as well as that which embraces the mechanical side of our calling. Therefore I believe one of the grandest advances made in dental education was when this Society broadened its horizon from that of a mere craftsman to take up and discuss the pedigogical side of the teaching of science in our dental colleges in a way and manner that will do credit to the profession of dentistry. Unless dental students are trained in the various scientific branches, so-called, as presented in the scope of our curriculum, we must necessarily be empirics.

Our essayist has called attention to the dark curtain that falls between the profession of dentistry and the high rewards that stand out and are in store for members of our calling, when they can stand out before the world as not only being capable of mechanically restoring lost parts, but can relieve the pain of suffering individuals by scientific means, and especially when all of the sciences are laid at our doorsteps we should not refuse to use them because we are incapable on account of the lack of teachers and thinkers to study these subjects more thoroughly. We should broaden our foundation of science to truly a profession, in fact, as well as in imagination.

Dr. Buckley's presentation of this subject will make us all more reverence the truths of his assertions if we will take them back and put them into practice when our schools again assume their progress. We need more teachers like Buckley, men who will get down at night and prepare themselves to present their subjects to their students in an interesting and scientific manner. The three subjects mentioned by the essayist would naturally be classed among the inductive sciences, therefore only inductive methods of teaching them should be discussed.

I must differ with the essayist with reference to written quizes, or we may call it if we choose, written examinations, repeated every so often. It is only in written quizes that the student can reduce his thoughts to cold facts and thereon inscribe them. Oral quizes are of the greatest benefit, but they should only be used as reviews for maintaining a constant application of the student's mind to the points that are most important, and the corrulated questions that surround them. My observation in reviewing a great number of examination papers of various State Board questions, I am more convinced than ever that the practical written quizes should be followed religiously by our dental college teachers, and especially in those subjects that we call inductive sciences.

I want to say with all earnestness, for the benefit of dental education being raised to the dignity of a profession worthy of the name that we give our students a better and a more fundamental training in the so-called scientific subjects. We owe it to ourselves, we owe it to our students, we owe it to the people who look to us for the advancement of our calling. From my observation in the last two or three years with the State Board of Dental Examiners, I have learned that our standard is extremely low. We must remedy our defects in our dental college teaching, or the good name we possess as American dentists will be lost. Mechanics in dentistry is the essential thing of our life as an existing art, but if we fail to estimate the force of the current we will never be able to build a rampart that will stand.

Dr. Eli H. Long,
Buffalo, N. Y.

Dr. Buckley has given us an ideal outline and an ideal method of teaching this subject. Of course, different schools must adopt methods according to the teacher. Being a physician, I can not carry the subject of therapeutics to its finish in the dental school, therefore that part of the work is left to the teachers of special pathology and operative dentistry, while I branch off into physical diagnosis and anesthesia.

I agree in the main with the esaayist. If the course is pursued as he has outlined it, we will get excellent results, and there will be little need of a poor showing before licensing boards.

In regard to the method of teaching, I let go of the lecture method some time ago. I like to employ, as far as possible, the Socratic method, that is, the free interchange of thought between teacher and pupil. The nearer we can get down to the student's plane, letting him feel free to ask questions as well as answer them, the better the results will be. If at any time I want to lecture for a while, I have it understood that any student is at liberty to interrupt me with a question, because the asking and the discussion of that question may be of greater importance than anything I may be telling the students.

I was glad that the Doctor emphasized the importance of the United States Pharmacopoeia; not that I feel like adopitng it as a text-book, but to take it as a basis for the study of drugs is certainly wise. The official standard of drugs as to their purity and their preparations should certainly form the basis of our materia medica. The National Formulary is also of value. It is a mine of resource.. As a matter of fact, nearly every proprietary that has any worth at all will have its counterpart in the National Formulary. It contains the formulae of about eighty-five different elixirs, which means that we can put up in pleasant form nearly all bad-tasting drugs. There is no excuse for taking up anything that is advertised and brought to our door. I agree with the essayist that the fault there lies with the teacher.

It is almost as bad in medicine as it is in dentistry. In the medical department I use about twenty hours for actual prescription work in the Senior year. This is very profitable. It is well to take into the lecture room samples of different things that are brought to us and to point out to the students the commercialism of the manufacturer. We are coming to the point where we can guard them against using everything that comes to them in the form of an advertised preparation.

I appreciate the importance of this topic and I hope that we can carry out more of the excellent ideas that the essayist has set before us.

Dr. C. E. Jones, Chicago.

I so thoroughly agree with everything Dr. Buckley said that there is little for me to say by way of discussion. I have introduced some things in our own school which it may interest you to know something about. In the freshman year we teach materia medica, taking up the pharmaceutic preparations, paying no attention to the groupings of remedies, because we find that it confuses the student. He makes no distinction between the pharmaceutic and the therapeutic forms of the remedies. The work in this year is done by competent quiz masters and lecturers who make special dental applications of these remedies. When we begin the study of pharmaceutic preparations, such as waters, we make up in the laboratory cinnamon water and ammonia water, and we have found this practice to be immensely beneficial to the student. When we study the liquors, the student makes up the liquor ammonii acetatis and Lugol's solution. Each student gets the proper ingredients from the Curator and compounds them in the laboratory. We try, as a rule, to make one example of each of the pharmaceutic preparations.

In the second year we begin with Long's Materia medica and take up the therapeutic groupings. Considerable attention is also paid to pharmacology. For instance we make an infusion of digitalis and experiment with it on animals.

We expose the vescera of a dog and make recordings with the cardiograph and sphygmograph, so as to study the actions of digitalis.

We are getting splendid service in that way. We follow that line of thought in all our work and find it very beneficial and instructive to the student. It does not confuse him. The object is to give him a scientific foundation.

We try to counteract, as far as possible, any tendency to prescribe proprietary remedies. We make the student prepare a better dentifrice than he can buy. We have him put up Liquor Antisepticus—a splendid mouth wash—that is better than anything he can buy. We are in hopes we can overcome the tendency to advise the use of proprietary preparations by making him familiar with the ingredients contained in most of the official preparations.

In the third year we take up the therapeutic action of the agents studied in the previous two years, but that work does not differ from the plan outlined by Dr. Buckley.

OPERATIVE TECHNICS.

(Historical and Suggestive.)

BY D. M. CATTELL, NASHVILLE, TENN.

The regular meeting of the Odontological Society of Chicago was held at Le Berg's Garden, 625 North Clark St., at 6.30 p. m., June 19, 1888.

The meeting was called to order by the President, Dr. Edmond Noyes.

The following members and visitors were present:

MEMBERS.—Drs. Noyes, Cushing, Harlan, Brophy, Swain, Black, Gardiner, Wassall, Ames and Kester.

VISITORS.—Drs. Eustace of Dakota and Cattell of Chicago.

After an elaborate dinner, served at one of the tables in the garden, the company adjourned to the "lodge house" of the grounds, where Dr. G. V. Black, the essayest of the evening, read a very interesting paper on "Outlines of a course of Study in Operative Dental Technic," which was discussed by the members and visitors.

Dr. Geo. H. Cushing thought the work suggested by Dr. Black should be done by the student at the very beginning of his professional career. Suggesting that the blacksmith does not put his apprentice at work shoeing horses immediately on his entrance to the smithy, but at something he is expected to spoil in his first efforts.

Dr. A. W. Harlan thought Dr. Black's paper would mark the beginning of a new era in dental teaching. (And so it did.—D.M.C.)

Dr. D. M. Cattell said that the paper expressed entirely new ideas proposed for a part of a dental college course. That the only thing, even suggesting such a course, known, was found in the habit Prof. C. L. Ford, Anatomist of U. of M. Dental Dept., had of carrying over from the Museum to the Dental Dept., when occasion permitted, a lot of extracted teeth, breaking open some and sawing others so as to expose the chambers and canals within. The idea that the things alluded to in the paper should be presented to the student mind early in his professional studies seemed the proper one.

Dr. Wassall thought Dr. Black had voiced the sentiments of every teacher of Dental Anatomy, when he says "there is no like work on the subject, but a very needed one"—and hoped Dr. Black would continue his good work until every college should adopt such a method of teaching, and that in time a suitable book for such study should be brought out.

Dr. Edmond Noyes remarked that this plan as suggested by Dr. Black bears the same relation to the Dental College that Manual Training does to our Educational Institutions. There seems to be a question of time that is necessary to present this to the student properly. The adopting of necessary time suggests a three year course in dental training before graduation.

Dr. Brophy spoke highly in favor of adding such a course to the College curriculum; thought there was a place for it; and that the work as outlined best fitted for the first year students. He proposed to give the course a fair trial in next year's session of the Chicago College of Dental Surgery.

The doctor introduced a cheap articulating frame suitable for holding casts of upper and lower jaws in proper relation—a strap hinge so bent as to simulate the regular stock frame good enough for student use as needed in technic work.

Dr. Black, in closing the discussion, remarked in part, that he thought that our specialty was based largely on manipulative ability and as instructors it was our duty to teach manipulation-finger craft. That the ideal course was to interest the student in so preparing himself for the practical part of the course, that he might do justice to the patient.

Subject passed.—Adjourned.

P. J. KESTNER, Secretary.

The foregoing has been copied almost verbatim from original minutes. Occasion was taken to interview the majority of those discussing the paper so that there might be no mistake in reading the meaning of their words as expressed in the original.

My object in going back to the quoted article is that I might bring before this body of teachers the very first thoughts expressed publicly on the idea of what is known as "Operative Technics."

I also want to establish the facts concerning its origin, that all men may know that the inception of the scheme, the writing of it out and delivering to the profession publicly, emanated from the mind, the hand and the voice of our beloved friend and councillor, Dr. G. V. Black; that the first dental school to pick up, carry in, cradle and nurse the new-born thought, was the Chicago College of Dental Surgery, in the year of our Lord 1888, session of '88 and '89, also that this paper of Dr. Black's embodying these original ideas was first read before the Odontological Society of Chicago in June 1888, and first published by the Dental Review of July of the same year. See Exhibit "A."

These facts I now iterate in your hearing, that all interested may know. The reason for this boldness and assertiveness is that there seems to be a disposition on the part of some to give credit to the origin of this most important step to other than the "teacher of teachers" among us and that the Chicago College was not the first to dare give the outlined course a trial. I submit the facts as I know them and now publish the challenge—knowing well that none can enter the Arena and prove that the foregoing statements are incorrect. If I be not unhorsed in the encounter the champion badge of originality must be worn by our distinguished preceptor and friend.

The noise of this new departure in teaching, taken up by the Chicago College, was sufficient to create considerable curiosity among several dental teachers and some amusement among others.

During the winter course the technic class was visited by a number of teachers from distant schools. It is remembered that during a gathering together of Dentists from all over the land the following Spring that a crowd of interested teachers collected in the Technic room (Kindergarten or Sunday School, as some facetiously put it) and asked to have explained to them what the course consisted of and how the work was carried on. I wonder how many of those who sat on the bench of "persuasion" are with us to-day. Let's see, there were Tom Weeks, Jim Dale, Ne'll Hoff and Harry Carlton sitting in the front row.

H. S. Guilford, H. A. Smith, Francis Peabody, Henry W. Morgan and others whom I can not now recall but whose names I would gladly insert could anyone favor me with them. For all the hesitating way in which the explanation was given the interest never slackened. When the work of the class was exhibited, showing the result of the new ideas, enthusiasm was surely aroused. Incidently, let me remark, that that was the original exhibit of technic work.

Many of these gentlemen expressed themselves in no uncertain terms that they would go home with the intention of establishing such a course in their respective schools as soon as possible. Sure it was that three years after, or four years from the pioneer course, there were 11 schools giving such a course more or less extensive.

Those were great days, when every teacher in this work was vieing with his fellow, each striving to outdo his co-laborers in presenting some new addition to the course. Those were days of pioneer planting, hoeing and weeding. Many ideas were introduced, tried and plucked out as unworthy further effort. I remember every year Brother "Tomathen" of Minneapolis would come down to Chicago, with cheeks extended, eyes all alight and head swelling—sure that his Technic Class had been doing stunts that others had not thought of. However, on going the rounds of the colleges his cheeks would resume their natural planes, his eyes lose their luster of excitement and the chilly sensation running up the back, on reaching the head, allowed his hat to settle to its wonted position. He could then write in his diary: "Everybody works but father Tomathen."

In those days a complete and understandable description of human tooth forms and surfaces had not been written. As description of teeth was one of the studies outlined in Dr. Black's article referred to, it developed the need that some one should write such a book. I remember some of us were continually bothering Dr. Black and other teachers to help us in pointing out the "landmarks" upon the teeth. Finally, Dr. Black in his characteristic way, thus delivered himself: "Look here, just because I suggested that a closer study of the teeth be made, you fellows mustn't think I know all about it." After a pause, he continued: "I guess I'll have to take a vacation and sail away in the 'Microbe' in search of things to help out."

Sure enough, in the summer of '89 the Doctor was to be found only on the north shores of Michigan, or sailing the waters of Lake Superior. On his return he showed many original pictures of tooth surfaces, done in India ink. The following year, late in the session of '90 and '91, the students had placed before them a "Descriptive Anatomy of the Human Teeth," by G. V. Black, M. D., D.D.S. A most complete and precise work—Nomenclature, measurements, descriptions of tooth forms, surfaces, pulp chambers, root canals, normal alignment, occlusion, etc. See Exhibit "B."

As the technic work developed new suggestions were continually budding, new needs presenting. There came a time in the systematic working out of certain technical procedures, with the class in session, a neccessity that each student should select from the set of instruments before him, one of a certain character or order, let us say, a hatchet excavator. Now, to do the work required at the moment, that hatchet should be of certain size and the blade should be at a certain angle with the handle, but there was no way that a teacher could designate to the student just which instrument of the hatchet class was required. To teach exact methods each student should have certain prescribed text-books, instruments and whatever paraphernalia needed. Especially was it found to be necessary for each student to have like instruments while excavating and shaping cavities. Suppose an instructor would call upon the class to select, each from his individual set of instruments a chisel or maybe a hoe. Say, what to the instructor's mind, would be described by the expression "medium in size, angle moderate." The expression would convey different impressions to individual students.

There was no exact nomenclature. The stock numbers signified nothing. Different makers often numbered differently, and frequently certain instruments were withdrawn from the market, and those that were left renumbered.

So again, we had to go to our associates in the profession, to our fellow teachers for suggestions asking for some classification and method of exact naming. Dr. Weeks made the first plausible classification of instruments in his "Manual of Operative Technics." (See Exhibit "C"), but that did not help out much in class work, so again, we found a sympathizer and helping hand in Dr. Black—none other responded.

Nov. 17th, 1892, Dr. Black placed in my hands a copy of the original manuscript of 63 pages, typewritten, entitled: "Dental Instruments and Instrument Teaching," with a drawing or illustration of a proposed steel plate guage to be usde in measuring dental instruments in millimiters and centigrades, also illustrations of 59 instruments gathered form dental supply houses. With these illustrations and the manuscript definitely classifying instruments, giving the nomenclature and rules for measuring and formulae, numbers, etc., were 20 excavators made of brass wire, attached to a card and labeled with the formulae numbers made from measurements with the Dental Instrument Guage. Accompanying all these was a letter asking that the work be studied carefully and the experiment of getting system and order out of the instrument chaos be tried upon the Freshmen of the Northwestern University Dental School, that being the one I was connected with at the time. See Exhibits "D," "E," "F," "G," "H," "I," "J."

The idea as set forth was "tried on the dog," so to speak, and found to be too complicated. So the following year, 1893, a manuscript supplement of 17 typewritten pages was added, proposing several changes.

The work of Instrument technic teaching went on—each year some change would be made, cutting out the weaker points, and adding to—all the while systematizing and naming more accurately—Dr. Black watching, suggesting and "taking notice." Finally in 1897 another paper was written by Dr. Black, entitled "Instrument nomenclature with reference to Instrumentation," and read before the National School of Dental Technics at its annual meeting, in Chicago, of that year (See Exhibit "K"). This paper was published in the Dental Digest, 1898, from which several thousand reprint copies were made and distributed among the schools that had in the meantime taken up the work as a part of the technic course. This was the first public exhibition of Black's "Instrument Scheme," except that in 1895, before the same society held at

Asbury Park, I read a paper with Dr. Black's consent, entitled "A Talk on Instrumentation Technics" (See Exhibit "L"), quoting from the unpublished manuscript of Dr. Black's and adding some thoughts of my own, followed by a black board exercise.

From the impetus given this field of the work by the reading and publishing of Dr. Black's "Instrument Scheme," many schools added to their technic course what I have sometimes called "Instrument Technology." In this we find a systematic and helpful classification or grouping of instruments, a specific naming of them, a comprehensive description and formula of each individual instrument, so worked out by rule, that the simple naming of a few figures casts before the mind's eye the exact size of the working points, the proper angle, if there be one, of the blade with the handle as well as the length of the so-called blade. The rules guiding the arrangement of the formulae have such definite meaning that any instrument maker, knowing them, can produce such instrument from the reading of the formulae numbers without having a pattern before him—whether it be a mon-angled, bi-angled, or triple-angled hatchet, hoe or spoon excavator or round-ended, smooth-faced plugger.

Not only are these things systematized in the student's mind (which of itself is knowledge stored), but the working out of instrument forms from brass or other metal produces a finger craft; an intimate acquaintance with each instrument; its formula and its capability.

There are two other points I wish to bring out before I have done with this meager sketch of initiative steps.

The technic teacher who first produced sketches of tooth surfaces, done by students was my old "running mate" Dr. Tom Weeks, who in the winter of 1891-92 put his class to work at free hand drawing. The one to introduce the carving of ivory into tooth forms, our beloved friend and co-worker, the late Dr. A. P. Southwick in the winter of 1892 and '93.

Two things the writer claims to have interjected into the course. One is called "Dental Nomenclature," some 200 or more technical terms that the student needs to become familiar with early in the course. (Exhibit "M.") The other is called "Pathology and Treatments," applied to "Dummy Patients." In all else I have been a follower; the way was pointed out, I simply followed the lead. I take pride, however, in the feeling that I have kept abreast with my confreres and that the zest to catch on to new methods of how to teach or what to teach is as vigorous as in the days of '88, '89 and 90.

Before I begin the "suggestive" part of my paper, I wish to review with you the origin of our Pedagogic Society.

At the World's Columbian Dental Congress, held in Chicago, Aug., 1893, the author of this article read a paper before the Section on Operative Dentistry, entitled "Operative Technics," which was the first paper written on the subject following the one by Dr. G. V. Black, in outlining the course written in June of '88. (See Exhibit "N.")

This paper was discussed by Drs. H. P. Carlton, Andrew Rose, T. E. Weeks, H. A. Smith, Don M. Gallie, G. V. Black and Otto Arnold. After the author had closed the discussion, Dr. Weeks suggested that there be a meeting together of all those interested in teaching Technics, in some convenient room later in the day. So in Room 39 of the Art Palace, Chicago, Friday, Aug. 18th, 1893, at 4.30 p. m., there gathered together the following gentlemen: Drs. T. E. Weeks, Henry W. Morgan, J. A. Dale, D. M. Cattell, W. H. Whitslar, G. H. Wilson, H. P. Carlton, Jonathan Taft, H. A. Smith, Francis Peabody, J. B. Willmott, A. Rose, T. W. Brophy, L. S. Tenny and W. E. Harper; 15 in all, representing 11 Dental Schools.

Dr. Weeks made a statement that the object of the meeting was to organize a society of teachers of technics.

H. A. Smith was selected temporary chairman and J. A. Dale secretary. After short talks by most of the gentlemen present, Dr. Whitslar moved an election of temporary officers. The action resulted in the selection of D. M. Cattell, President and J. A. Dale, Secretary.

The President then appointed a committee of three, consisting of Drs. Weeks, Carlton and Dale to draft constitution and by-laws looking toward a permanent organization; this committee to report at next meeting which would be held in Aug. the following year at Old Point Comfort, in conjunction with other National Dental Associations. A motion by Dr. Weeks was unanimously carried that the name of the Association be called "The National School of Dental Technics." See Exhibit "O."

Henry W. Morgan moved that the membersihp be limited to colleges belonging to the National Association of Dental Faculties and that all members of that body be invited to join the school. Motion carried.

Adjourned to meet at the call of the President and Secretary. Exhibit "P".

The following year Aug. 7th, '94, in the Hygiea Hotel at Old

Point Comfort every school was represented that took part in the initial organization the previous year in Chicago.

Dr. Weeks, Chairman of the Committee on Constitution and By-Laws, presented the committee's report which was adopted, section by section.

The wisdom of that committee's work in so binding us together as teachers teaching each other how to teach, is apparent to-day. They knew not how well they builded. Five years the work was carried on vigorously. The first few years were devoted almost entirely to methods of teaching operative and prosthetic technics, but the field of Pedagogic work broadened gradually, so at a meeting in Cincinnati, Dec. 28th, 1898, it was decided to amend the constitution and call our association an Institute of Dental Pedagogics, and under that head it has flourished now for eight years.

It is said to be the most profound and interesting Association of Dentists in the world.

> "It's not so hard to write when ideas come,
> But oftentimes when feeling on the bum,
> The mental mill refuses for to grind;
> Of what to put down next, I'm thinking some."

Note.—The Exhibits ranging from A to P inclusive, consisted of original manuscripts, drawings and printed articles from which data was gotten. These were spread out on a table so that anyone who wished could examine after the reading of the paper.

Operative Technic Course (Syllabus).

Nomenclature	A study of 200 or more of the more important Technical terms used in Dentistry.	
Dental Anatomy . .	Macroscopic study...	Dissection of each denomination of teeth (16). Carving of tooth forms in ivory or other material (8).
	Description of tooth surfaces	Assembling of extracted teeth. (Notation.)
	Pulp chamber and canal study.........	Free hand drawings of tooth surfaces (32).
	Microscopic study . . .	Sectional cutting. Mounting on slides and studying through microscopes; also enamel rods from Carious dentine.

Instrument Technology	Classification or grouping................. Nomenclature . . . . . . Description of forms . Rules of procedure . . Instrument formulae	Reproduction in brass or other material of certain classes. Assembling in groups.
Cavity Technology	Classification. . . . . Naming cavities and cavity walls . . . . . . Sharpening instruments . . .. Grasps, rests, instrumentation.	Forming cavities by classes from measurements and rules given.
Filling Material. . .	Classification . . . . Introduction and history. . . . . Preparation, introduction and manipulation.	Filling cavities prepared in bars of ivory, carved tooth forms and natural teeth.
Pathology Treatments	Studies of supposed odontalgia. . . . . Medicines used in treatment of same. . Bleaching	Application of medicines to "Dummy Patients." Cleansing, treating, enlarging and filling root canals. Dissecting same to note perfection or otherwise of operation.

Discussion.

Dr. N. C. Johnson, Chicago. The self-abnegation of the essayist is unsurpassed. If I or any eight or ten men were asked to name the man of all others to whom this Association owes its largest measure of success, we would name the essayist of the evening. We hear Dr. Cattell continually giving credit to men to whom credit is due, but always placing himself in the background. To him is due as much credit as any other man connected with this Association.

(Remainder of discussion read.)

History when accurate is well worth while and although the essayist wrote me that there would be nothing to discuss in his paper, yet it has seemed to me that he has given us a very suggestive resumé of the beginning and subsequent development of a very important movement in dental education.

It is seldom that men are able to accurately judge the full significance of any new venture in professional work. Sometimes the initial effort seems halting, doubtful and chaotic, but the work gradually developes into a systematic and well-rounded out achievement which materially influences the progress of the profession while at other times the inception of a movement gives great promise only to result in a few spasdmodic outbursts and then to die away into oblivion.

The difference is that in the one case there is a real need, in the other only an imaginary one created by the overenthusiasm of a few dreamers. But in some instances we find a movement inaugurated under the most favorable circumstances, developing from the start into a strong and useful organization, and continuing in its good work year after year in a way to excite the admiration of all connected with it, and to raise a natural conjecture as to what the profession, or a part of it at least, would have done without it. Such a movement is the one whose history we have just heard outlined so admirably and it is significant of two things—the great need of such a movement and the enthusiasm and painstaking effort of the loyâl men most instrumental in its development.

These men have done more for the advancement of dental education and the improvement of teaching methods since the organization of this society than was ever accomplished before in a like time in the history of dentistry, and I am not sure that I should be far from the truth if I contended that they have done more in that time than was ever before accomplished in this work in all time.

It has sometimes been said that there was a tendency to magnify the technical in dental teaching out of all proportion to its importance, but when it is remembered that without technical skill the best informed dentist living is incapable of renderlng proper service to his patients, this contention does not hold good. In any event when this society was organized there was sure a great need for the introduction of better methods in technical teaching, and those who are thoroughly familiar with the situation will not hesitate to acknowledge that the young men who are being graduated under our present system of dental education are better equipped to treat their patients skillfully than were those who were sent out during the old regime.

In any event the scope of this society has been so broadened in recent years that it embraces the consideration of every topic connected with dental college teaching, and we may well congratulate ourselves on the advancement made, as well as to take courage and inspiration for future guidance. It therefore seems eminently proper to have our attention called to the early development of the organization, and to give public credit to the men most instrumental in its progress, more particularly in view of the fact that on this occasion we have had the pleasure of listening to one of the men who has modestly and loyally contributed in a very large measure to its success.

Dr. H. B. Tileston, Louisville, Ky. The first portion of Dr. Cattell's paper, the historical part, was all I received upon which to base a discussion of his interesting and instructive contribution. The promised "suggestive" part did not reach me with the original draft sent to me by Dr. Hillyer, and hence I was unable to prepare a discussion of it.

The history of the origin of the idea of a dental technic course as detailed so interestingly by Dr. Cattell certainly establishes beyond any doubt that Dr. Black is entitled to full credit for both the conception and promulgation of a method of teaching operative dentistry which has changed our former haphazard methods to a scientific system, from which has come the most gratifying results. The wonder seems now to be how we ever presumed to attempt to prepare students to enter the operatory, there to make victims of their ignorance and unskillfulness, of those who rashly submitted themselves to the ordeal in any other way than by a previous training in technique such as is now employed. So natural it seems to pursue that method now that it is inconceivable why it was not thought of in the beginning of dental teaching. The solution of all problems and difficulties seems very simple post factum, but it required a master mind to conceive of and mold into practical system the technic method of teaching operative dentistry as it was given to us by Dr. Black.

As Minerva sprang from the head of Jove full panoplied, so came this technic method practically perfect from Dr. Black. Many details have been added since then by Dr. Cattell, Dr. Weeks, Dr. Brady and others, whose contributions we all gratefully acknowledge, but the primitive central idea has only been enlarged upon, not changed. And these additions came very rapidly, so that the development of the method was accomplished in the first few years of enthusiasm, since which time very little has been brought forward that was worthy of general adoption.

I want to make a suggestion which if properly developed, I am quite sure will be a valuable addition to our technical manual training of dental students, and that is the cultivation of ambidexterity. There is no art, not excepting even that of surgery, in which the faculty of using both hands with equal dexterity is so valuable as in operative dentistry, and very few indeed possess this faculty either by gift of nature or by cultivation. We are all, practically all, right-handed. About 98% of all persons are right-handed, 2% are left-handed and now and then we see one who is naturally ambidextrous.

Just why the human race is by so large a majority right-handed has never been satisfactorily explained. The circumvolutions of the left hemisphere of the brain, which contracts the movements of the right side of the body, are larger and frequently more numerous than those of the right hemisphere, but whether an individual is right-handed because of that fact or whether the left hemisphere is developed more fully because the right side of the body is used most, is a mooted question. It is claimed by some scientists that man is not necessarily uni-dextrous. That he has become so by the habit, dating back to very ancient times, of using his right hand more than his left, possibly originating in the custom of our ancestors of holding a shield with the left hand to better protect the heart in combat, leaving the right hand to the more skillful task of wielding the sword or lance or club. But however right-handedness came about, it is known to be quite possible by studious effort, to so train the left hand that it may he used almost if not quite as skillfully as the right. There has been recently formed in London, a society for the development of ambidexterity, whose members agree to endeavor to induce, by teaching and example, both children and adults to use the left hand as freely as the right.

I believe that a left-handed person can more readily cultivate the use of the right hand than a right-handed person can acquire facile use of the left hand. I may be wrong in that observation. A left-handed person is probably more likely to put forth the necessary effort to cultivate his right hand because his left handedness makes him appear peculiar and somewhat awkward and in striving to place himself right with his fellowman he becomes, in a measure at least, ambidextrous. The right-handed man, having no such incentive, is likely to neglect all effort to train his left hand to be anything more than an assistant to his right.

If it is possible then, to overcome unidexterity by the systematic cultivation of the other hand, why could not such an effort be properly made in the training of men to be dentists? Indeed it becomes important to make this a part of the dental manual training course, recognizing as we must, the extreme value to the operative dentist of being able to use either hand with equal freedom. No specially arranged course need be devised for this purpose. The present technic course is sufficient for the training of both hands as well as for one. I suggest that the student be required, after doing a certain thing with his right hand, to repeat the same with left, or vice versa if he is left-handed.

Beginning with course in prosthetic technic, I would have him practice the use of the file, the saw, the hammer, carving tools, etc., with his left hand, and continue this training through the operative technic course, using excavators, pluggers, brooches, the engine handpiece, etc., with his left hand or his right, if left-handed, after having practiced in the use of these instruments with his natural hand first. I believe that such training carried through his technic courses and continued through his infirmary operations would at least start a student into habits that by perseverance in after practice, would result in practical ambidexterity.

Dr. John I. Hart,
New York.

It is remarkable how in every field where a demand is created or a necessity arises that ways and means are found for fulfilling that demand. It was remarked by one of the former speakers that it was strange that dental technic was not taken up earlier in general dental education. Presumably it was not taken up because the necessity did not exist to the same extent that it has in the past fifteen years. The student body was different then from what it is now. The large proportions of students entering dental colleges at that time had previous dental education in dental offices where they were taught sufficient manual dexterity which enabled them to take up their dental course with more intelligence than the average student can who enters a dental college to-day. If it were not for this course in dental technic I doubt very much if twenty percent of the students in our colleges to-day could be turned out to practice dentistry satisfactorily.

We can not give them in their first year too much work in the line which will give them manipulative dexterity. So much time is spent by the average individual to-day who is about to take up a professional career in preliminary educational work that the type of student is changed. Students do not come to us as a class who have worked out their own salvation. Their minds have been trained and not their hands. I will not say that that must be undone, because the mental training has been to their advantage. It permits them to take up theoretical work; but in my estimation, if these students were allowed a certain number of counts for manual training, it would facilitate our work immensely. They would take up the dental technic course with much greater facitily than they do to-day.

I agree with Dr. Johnson that Dr. Cattell is entirely too modest; that in giving history of this most important branch of dental education, he has placed himself in the background, and it is incumbent on this Society to give him the honor that is due him.

Dr. G. V. Black, Chicago.. Dr. Cattell has done the principal work in this field. Whatever I have suggested Dr. Cattell has worked out and arranged for classroom work, teaching his students this technic course ever since he entered on the work in 1888. He has been continually devoted to this subject, developing it more and more all the time. I have done something in the way of suggestion, but I never went into the class room to teach operative technics. Dr. Cattell has been at it continually all these years, and development is due to his teaching. It is one thing to suggest, but another to carry it out. Dr. Cattell and those associated with him have demonstrated the value of this work, and the results have pervaded the entire country. They have even extended to Europe. In England they still hold to the indenture system. The student is indentured to a practicing dentist for so many years before he enters the dental college. The Royal College of Dental Surgery in London arranged a little alcove room in which I found a prosthetic bench, and on inquiry I was told that they were trying to experiment of doing the American technic work, taking students directly from the preparatory school and putting them here to work. They found the results so much better that they were compelled to adopt the method. I also found the same thing in Heidelberg, in Paris, in Berlin, and every other place I visited.

Now it is these men who have developed this work who should have the principal credit, and I know of no man who has done so much as has Dr. Cattell.

With reference to the technic work, we have not succeeded as yet in eliminating the question of expense. I hope, however, very soon to devise some means of doing that, so that these fillings can be studied as they should be. We make fillings in what-not and we see only the finished product. What we want our students to do in the technic room is to make fillings and then to take them out and study the adaptation of the fillings microscopically. I believe that it is very important that they should do so with amalgam, gold, tin and other filling materials. This is one feature that has bothered me a good deal. Every student who will undertake to fill a matrix and take out the filling and see whether the walls of the cavity have been perfectly adapted, will get an eye-opener. It will cause him to think and study the subject of adaptation every much closer than the means of adaptation.

There is another suggestion that I wish to make, and that is that in our effort at instrument nomenclature we have overlooked one thing that is without a name, the portion of the plugger-point between the bend, if it has one, between the curve that corresponds to the blade of the excavator.

Dr. D. M. Cattell, Nashville, Tenn. I wish to thank you all for your kind words, but I want to explain more fully the object of this paper. It has been said more than once that the Chicago College of Dental Surgery was not the first school that nursed the child, and I thought it was time to correct this statement. If anyone thinks otherwise this is the time to say so. It has also been said by those who do not know, that Dr. Black was not the originator of the idea, and I got tired of listening to such talk. If anyone knows of anything to the contrary, this is the time to say it. Now is the opportunity to place this matter before the world as it should be. That was my object in writing the paper. As the author of the paper, I did not feel like saying what I have done. I know what I have done, and so do you. I have been under good training, and was greatly helped, but if it had not been for the good men who counseled me, the thing would not have been accomplished. Any other man would have done the same as I. I appreciate the kind feelings you have for me and what you have said, but I have only done things after some one told me how.

I am very sorry to say that there are not as many schools in the United States to-day that are teaching technics as there were five years ago. Why this is, I do not know, but I do know that several of the schools that used to give a good course in operative technics are not doing so now. They are not teaching as much as they used to teach. I am very sorry because of this, for technics is the salvation of the future dentist. It is the thing that makes the dentist. If he begins right, he has the opportunity of continuing right. If he does not start right, he may never be switched onto the right track. I would like to know why there is a restricting of the course in some of the larger schools, and why there are so few schools teaching operative technics. This manual training gives the student the necessary finger-craft, before he is put to work on the patient in the operatory. You gentlemen who have gone through that course as students recognize the fact that you have gained by it, and in the face of all that a number of our schools have laid down instead of pushing ahead. Are they hunting up something new, developing something else?

My paper was written with the hope that my old running-mate, Tom Weeks, would be here, and get up a little animation and enthusiasm. My hope, my counsel, my desire is that you teachers go back home and start the technic course again. Increase the course you have, or if you have not one, start one, and see that something is done in it. You that have this work in the Freshmen and Junior years and then have students come into the Senior class from other institutions, where this training is not given, know very well that those fellows are not as good as the students who have had the training. Why there is this lack of enthusiasm, I cannot tell. It worries me, because I know that the schools are wrong in dropping it. The schools that neglect it are not doing their duty.

Discussion of Dr. Cattell's paper reopened, on motion.

Dr. A. E. Webster, Toronto, Canada. I did not know that there was such a lack in teaching operative technics, a lack of enthusiasm, until Dr. Cattell mentioned it. Our technic course is more extensive than it ever has been. We believe in the course, and carry it out more extensively than the syllabus Dr. Cattell presented would indicate. I know other schools are doing just as well. I have never had an opportunity before to present our most recent method of teaching operative technics. I think we have a better method than any that has been mentioned.

There is another part of this paper that I might question, why Dr. Cattell takes the order he does. It would seem that he prepares cavities in teeth long before he treats the root canals. Why does he not treat the root canals first, and then prepare the cavity?

Dr. J. H. Kennerly, St. Louis, Mo. Dr. Cattell's statement that it appears to him that the former enthusiasm in technic teaching is decreasing seems to me to be verified somewhat by this meeting. I traveled farther than any other man last year to attend the meeting. We had twenty-one schools represented, and the question naturally arose why so few schools were represented at the meeting. In previous years, we had as many as thirty-three schools represented. The natural supposition was that this was due to the fact that we met so far East. Everybody said, come back to the middle West. I did all I could to bring the meeting to Chicago, because we have had the largest, if not the best, meetings in this city, but I am sorry to say that this meeting does not seem to be any better attended than was the one last year in New York.

It does seem that the indications are that there is a falling off in the teaching of technics generally in the schools. If you will visit the schools of the country, I believe you will find that there is a diminution in the amount of technic work done. I had some correspondence recently with the Dean of another school, a member of this Association. A student transferred to us from this school and claimed he had done as much technic work in the first year as we do in two years. He claimed that I should give him credit for all this work, because his school was a member of the National Association of Dental Faculties. I told him that if he would bring his work to me, I would pass on it. My criticism of it caused him to write to the Dean of the school from which he came, and I received a letter of rebuke because I would not give the student credit for the technic work done by him. I finally asked the student whether he was willing to go into his profession with the present ability that he possessed in the line of prosthetic dentistry. He finally said no, and agreed to take the work of the second year with us.

We can not afford in our transfers to allow a man to come from any other school that has slighted its technic work and give him credit simply because he has put in the required number of hours, regardless of the character of work he did. There are some men who can not be taught dentistry and yet we have to take them. We do not need to get after the good fellows, but we must get after the weak ones. I do not believe, however, that you will find the diminution in the amount of technic work that Dr. Cattell seems to think.

Dr. N. S. Hoff, Ann Arbor, Mich. It seems to me that this delinquency Dr. Cattell mentions is not as real as it appears to him. He forgets that we have been making advances all along the line in directions that have rquired us to adopt other technic studies than the ones to which he refers. For instance, we have introduced the teaching of porcelain filling and gold inlays. This necessitated the addition of another department of technic teaching. It also requires time, and a great deal of time is consumed in giving the technic course for porcelain and gold inlays. In orthodontia we have taken up a new technic course, which also takes a portion of the time that has been allotted formerly to operative technic work. We have not materially shortened the time that should be given to the operative technic course. We have in fact added to it; almost doubled it and we are now developing other courses not to the exclusion or disadvantage of the technic course in operative dentistry. We are trying to keep pace with the advances in the profession. Because we are not just now talking so much about operative technics, it should not seem that we had lost sight of it. We have developed it to the point where we can afford to let it alone for a time while we are developing other things to the same plane.

Dr. G. V. Black, Chicago. One cause of the apparent lack of interest in the technic course has been the change in this Assosiation from an Ascociation of Technic teachers to one including all the teaching in the dental schools.

Dr. D. M. Cattell, Nashville, Tenn. For the benefit of all, I wish to state that I did not say what I did because this matter is not talked of so much in these meetings, but the exhibit of technic work is very small compared to what it used to be, and I notice that some schools bring only two or three pieces, selecting the very best they have. That is the size of the enthusiasm they have in this work. All the class work I exhibit here this year, except two trays of carvings, was done last year. I know four schools that have gone down in their work. Three admitted to me that they had done so and I know two others that have allowed the work to drop out entirely. They do not even pretend to have anything that could be classed under the name of technics. That is why I said what I did, and not because we do not happen to talk about it. I know we have many other things to talk about, but I want to reiterate that there are schools that are not doing their duty in this regard. I have great hope that the day will come when it will be a requirement that such a course be given in order to maintain the school in good standing before the National Association of Faculties and State Boards. Again I thank you for your kind words and appreciation of my efforts.

PROSTHODONTIA AS TAUGHT IN THE TUFTS COLLEGE DENTAL SCHOOL.

BY DR. J. KING KNIGHT, BOSTON.

I am afraid that the trite aphorism, "Fools rush in where angels fear to tread," may find a new exemplification in my coming before you at this time on this theme. Had I received a copy of last year's proceedings, and read the excellent resumé by Dr. Hillyer, showing how thoroughly the ground had been covered in previous years, I certainly should have hesitated to accept this honor. However, the subject of my paper, "Prosthodontia as taught in Tufts College Dental School," must be the apology for my appearance. While not claiming originality in our methods, it is a source of gratification in reading over the papers that have been previously presented, to find that so many of the plans recommended were already in successful operation at our school. It is to be hoped that the frequent repetition of the first person singular will not be attributed to undue egotism, but that you will remember I am confined to a personal experience.

When I was first appointed to this chair in the Boston Dental College in 1888, it bore the title of "Dental Art and Mechanism;" and altho some few lectures were given on related subjects, the students were required to do only artificial plate work; we were to carve one set of teeth in plaster, make one rubber set, a full upper and lower (practical when we could get them), a soldered silver set and a set of continuous gum on platinum. This embodied the work of the two years' course of five months each. I felt this to be very incomplete, and as rapidly as possible, changed to a graded course, introducing instrument making, orthodontia, carving and more practical work. Altho classes were small, patients were few; and it was frequently necessary to assign a patient to two or three students, and allow the patient to have the benefit of the best work. As time went on, classes increased in size, a three years' course was adopted, patients became more numerous, and it was apparent that more hours must be devoted to the laboratory than the lecturer could give. We were fortunate enough to secure the services of one who, altho not one of my former pupils, was in perfect accord with the methods of teaching adopted; and besides being thoroughly competent, was a strict disciplinarian, and knew how to handle students as well as how to impart information. Ten years of experience in this direction warrants me in saying that for us this is the best method so far devised. When there have been differences of opinion, we have conferred together and adopted that plan which, after thorough discussion, has appealed to both. I may therefore say that the department of Dental Prosthesis comprises two divisions—theoretical and manipulative—working in unison, and endeavoring to educate each student to the extent of intelligent and correctly applied mechanical principles. Believing that this department rests as the very foundation of our profession, we have striven to impress upon our students the importance of the fact that manual dexterity is absolutely essential to success in their future career; that while a mechanic might not be a dentist, every expert dentist must be a first-class mechanic; and thus, without in any way miminizing the the value of other studies, our aim has been to produce intelligent mechanics, leaving to others the privilege of developing professional scholars.

It is admitted that before anyone can accurately make any appliance it must find expression in the mind, and hence a graded course of lectures precedes the work in the laboratory, and the instruction that is given to the whole class is followed by individual work and supervision. (Some matters which were formerly considered a part of this department are now receiving special attention. Thus instrument making and carving calls for separate instruction under a very competent expert. Orthodontia and oral deformities, including the making of splints, obturators, regulating appliances, etc., are practically taught to the seniors, abundant material being at hand. And metallurgy is more successfully handled in connection with the chemical laboratory.)

The course commences with the freshman class and with one lecture a week to each class continues up to graduation. Beginning with the simplest details of plaster manipulation and impressions, it considers the composition of materials used, and includes a practical demonstration of the construction of all kinds of rubber, celluloid, fusible metal, aluminum, silver, gold and platinum plates, crowns and bridge-work, and porcelain structures. Particular stress is laid upon the axiom that "the highest art is to conceal art."

and hence we strive to have all artificial substitutes as natural in appearance as the conditions will permit, without in any way sacrificing utility.

These lectures are illustrated by models, charts and blackboard, particularly the latter; for altho I am no artist, and as I remember hearing one of our most successful teachers say: "I can draw nothing except with a corkscrew," yet I find it arrests the attention of the class to the point you are aiming at to make the time, if they can see the outline of the structure grow before their eyes as the lecture proceeds. A great deal of instruction is given from the platform upon subjects where specimen work is not required, for out of the lessons, the experiments and the failures of the past, there may ofttimes come the development of the future.

The matter of a prepared syllabus has been considered, but nothing entirely satisfactory has yet been adopted. The principal difficulty is that the student seems to rely too much upon that, attempting the cramming system to pass examinations, rather than depending upon the thorough knowledge to be gained day by day. Headings and catch words placed upon the board, not too plentifully, which the student must copy in his note book, and then fill in by colateral study or his recollection of the lecture, are to my mind more helpful in fixing the facts in the memory. This of course demands regular attendance, and here, I believe, we have a good record. A little dated card is handed to each student as he enters the room, he writes his name thereon, and these are handed in as he passes out. It is then simply clerical work to transfer these to the roll, and you are certain that there are none reported unless present. Last year our record stood: Seniors, number in class, 50, total attendance, 84%; juniors, number in class, 68, total attendance, 84%; freshmen, number in class, 90, total attendance, 85 %.

Oral quizzes are also a valued aid in review work, while two written quizzes each year, with a value of ten points each, with the final written examination, value eighty points, form the data for promotion. The quiz is given without previous notice, and is also an aid to regular attendance.

Turning now to the laboratory we find the professor in charge (of whom I have already written) together with trained and paid assistants, each having charge of some sub-department; thus, one will have the practical crown and bridge-work, with specimen work leading up to it; another the rubber work, or the metal plate work; while another will have the porcelain. Thus at some time in his course each student comes under each instructor, and we believe this to be better than assigning a limited number of students to each demonstrator and having him carry them through the course. The same graded system is used in the laboratory as in the lectures, and each student must present satisfactory specimen work before he is allowed to attempt the practical. This often necessitates making more than one specimen before a passing result is obtained. We provide for 396 hours of laboratory each year, a total of 1188 hours, and feel sure that any competent student who faithfully uses his opportunities will not go out into the world unfitted from our department. Permit me at this time to record the hope that ere long we may return to the four year course, and that the first year may thus be devoted to medical study preparatory to taking up this specialty.

The required specimen work is as follows:

FRESHMAN YEAR.

1. Hinged plaster models, upper and lower.
2. Vulcanite base, full upper, plain teeth, red and black rubber.
3. Specimen repair case, vulcanite.
4. Watt's metal, partial lower, 8 teeth, gum sections.
5. Vulcanite, partial upper, with metal clasps, brass, gauge 24.
6. Swaged aluminum base, full upper, gauge 23, vulcanite attachment, plain teeth.
7. Brass base, full upper, gauge 27, vulcanite attachment, gum sections, wire band around vulcanite, 16 rolled to 20, swaged air chamber.

JUNIOR YEAR.

1. Partial lower metal case, brass, gauge 28, swaged in three parts, wire band around vulcanite attachment, gauge 16 rolled to 20, gum sections, bicuspids and molars.
2. Full upper and lower, vulcanite, plain teeth, red base, pink gum, on Kerr anatomical articulator.
3. Richmond crown, silver, on natural root.
4. Two silver shell crowns, on natural roots, bicuspid and molar.
5. Hollingsworth banded Logan crown.
6. Porcelain banded crown, bicuspid, on natural root.
7. Staple crown on cuspid tooth.
8. Silver bridge of four teeth, with articulation, staple crown and shell crown abutments, natural teeth for anchors.

9. Silver base, gauge 26, cut out air chamber, swaged outside band, 14 single gum teeth soldered.

SENIOR YEAR.

1. Partial upper set with clasps, silver, gauge 29, double, fitted to natural teeth on plaster model, two or more teeth soldered to plate, clasps platinized silver, gauge 24.
2. Porcelain bridge, lower six anterior teeth, crowns on cuspid roots.
3. Museum set, selected.
4. Practical cases assigned.

Articulated jaws (full and partial) and prosthetic head are provided, that students may practice first on these in taking impressions and getting articulations, before experimenting on each other or upon regular patients. When a student starts upon a case, he is given a dated card, and at certain points the case must be presented for inspection and approval to the demonstrator, who thereupon punches out the appropriate number on the card and marks the date. This furnishes a complete record and check upon the case. Attendance is also compulsory here, the clerk giving a dated slip when the student comes in, which must be returned with his signature when he leaves. And no student is allowed to be habitually late, or to leave before the appointed time, without sufficient excuse. The marking of the work is by points, aggregating 100 each year for all the work required of that year, the student not being permitted to take advanced work until he has finished that which goes before. Practical work is given special prominence, counts for more points in making up the year's work, and where students show themselves competent it is accepted in lieu of specimen work. All of the seniors are required to satisfy the professor on all kinds of practical work, and many of the juniors are given opportunity for pracitcal cases.

I am fully aware that I have not succeeded in making this dry detailed statement interesting to all; I have simply told you what we are trying, in our humble way, to accomplish. If we have anything new, you are welcome to it; we certainly wish to express the sense of obligation we feel to many members of this Institute for suggestions received in the past.

Discussion.

Dr. N. S. Hoff, Ann Arbor, Mich. I am going to present to you something that is old, for the purpose of showing you that we are still doing technic work on the old plan. In our technic work, as in every other school, the basis of the practical is the technical department. We begin the prosthetic technic work with the Freshman class; and the first thing done is to take wax modeling compound and plaster impressions and make models from them. We divide the class into sections, so that we may better instruct them, and the students do this work on each other. These models are marked with the owner's name. The plaster model from the plaster impression is the only part of the technic work that is preserved by the school.

After this impression work is done, the students are given a series of class exercises on the surface anatomy of the teeth. · Each man studies his plaster models in order to familiarize himself with the teeth and their relation with each other. Then, each student is given five natural teeth, and he is instructed to carve from a cylinder of plaster each tooth reproducing the teeth magnified three times. This is a review which shows whether the students have the right ideas as to form and whether in looking at the teeth they can reproduce them in anything like their natural form. They are allowed to make certain measurements, but we prefer not to have them do this.

You would be surprised to see the difference in the character of work done. Some men do very good work, while others do not. Some students have not a good conception of form, but can reproduce it in a smooth and regular form. We consider that exercise worth a good deal.

Next, the student takes up the regular line of technic work. First he learns to vulcanize, making a plate with a single tooth on it. They make a plate which he breaks and repairs several times,so as to get exercise in vulcanizing. Then another plate is made in which the different styles of teeth are used, showing how to use them in partial cases. From that we go to the full cases. Then we follow this up with the swaged aluminum plate with vulcanite attachment, a partial lower Watt's metal plate, where the teeth are attached by pouring the metal directly on to them. From that we go to the metal plate, using brass for gold. After that we take up the crown work. Students are shown how to solder metal tubes, and how to make lap joints and how to sweat joints; how to do the different forms of soldering and how to swage seamless crowns.

All this work is done during the Freshmen year. In the junior year we take up the other technic work. We do not take up the operative technic work in the first year, but spend the time on the prosthetic technic work. In the Junior year we follow this up with work in making splints for fractured jaws and the making of a soft velum for cleft plate. After this we take up the instrument technics. Students are taught to forge instruments into shape, file polish and temper them. They are required to make instruments to measure, but there are certain angles which can not be made from mechanical measurements; these irregular forms will be of great help in developing skill in hand craft and initiation in all lines. We get out of this a great deal of technic training, and we consider it one of the most valuable technic exercises we have. Students by such exercise soon get a conception of what the instruments are and what they are for. When you talk about an excavator, they have already made one, and they attach a value to what you say that can not be imparted in a lecture. While I have a great deal of confidence in Dr. Cattell's brass instruments, they only serve the purpose of teaching the form of the instrument, no particular skill being required in constructing them. In making a steel instrument, the student gets a great deal of handcraft exercise. After that we take up the technic exercises in orthodontia. We used to make a great many instruments for making taps, etc., but we do not do that any more. The students are required to take plaster impressions of each other's mouths, making models as perfect as possible, showing all the essential features required to diagnose a case in orthodontia. Then they are required to go over these cases and study them. We have a blank card on which is printed a diagram of the teeth, numbered from 1 to 32. If any tooth is in malposition, it is indicated on the blank; then he records an outline of the treatment and adapts or makes the appliances to the mouth. The patients being students, this can be done easily. If it is a case that has no malocclusion, the student is required to make the appliance for a supposed malocclusion, so that he gets some technic exercise out of every case. In that way we are doing a technic operation before they undertake to do any of this work in the infirmary. They are taught to solder Magill bands and German silver wire is cut into small segments and soldered together. They are marked on all this work, just as you would if they had done it in the clinic or class room.

In this way we cover the technic course in prosthodontia in as completely as our time will permit us to do so.

We give a lecture course in prosthodontia, but not to the Freshman class. The First year everything is demonstrated to the Freshmen, and then they go into the laboratory and reproduce the demonstrations. The students in the laboratory are grouped into sections of eight, so as to expedite instruction. All the work is followed out in a systematic way, and we get good results.

One thing that bothers me is how to manage a prosthetic clinic. Our institution is in a different position from those located in the larger cities. We do not have a great many patients for practical work in prosthetic dentistry. Our clinic is largely drawn from the students in the univertity, about five thousand. In the operative department we have all we can do, but in plate work we do not get as much as we would like to have, nor as great a variety. My problem there is to utilize the material we have, so that every student will get the advantage of it. In our present building, we are unable to present these patients before the class, but I am trying to have a section of the students in the prosthetic clinic at a time, and to have students in every section see every case that comes to the clinic, a very difficult thing to do. I find it difficult to get every student interested in every case, and in every point in every case that comes to the clinic.

Dr. B. J. Cigrand, Chicago. This has been an extremely interesting paper to me because of two things. First, it has given us the evolution of our technic, and, second, it has suggested so many subjects that are open to debate. One of the things he touched on but did not emphasize fully was the absolute necessity for harmony between the teacher and his demonstrators. In our school, in the prosthetic department, when a lecture is delivered, the demonstrator takes the class to the laboratory and does the things that have been lectured about. The lecture is not continued until the work has been completed, thus keeping the lecture-room and the laboratory in close touch. This arrangement makes some students work harder, while some fall behind; but there is the impulse to progress.

Another feature spoken of in the paper was the fact that there must be harmony between the teacher and the demonstrator regarding the acceptance of work. We have this method: The demonstrator receives the work, but that does not mean necessarily that the work has been accepted by the school. We do not accept anything until all the work has been turned in and then the head of the department and his demonstrators review this work. Often parts of the work must be done over. In that way we have a perfect check on everything that is done.

Our Freshmen are kept busy the entire year with work pertaining to the various materials that are used for taking impressions. Plates are made of Vulcanite, Watt's metal, etc., the entire time being taken up by this work. The Freshmen do not make any bridge work or crowns. The Juniors are entirely absorbed in the making of bridgework and crowns, and our Seniors are kept busy making plates and bridges and difficult prosthetic work.

One reason why I do not believe that Freshmen should be taught bridgework and crown work is that the course should be graded. The student should be taught step by step, so that he will do well everything that he attempts to do. For instance, when teaching the subject of plaster impression, the student is kept in that department for six weeks doing nothing but taking plaster-of-Paris impressions, and you all must agree that if there is one thing in which the Senior class is as a whole weak, it is the taking of a good plaster-of-Paris impression. Therefore, we keep the Freshmen busy making impressions and plates of every kind.

A very excellent check to prevent students from handing in incomplete work to the demonstrator is to grade them on each step of the work they are doing. For instance, in making a Richmond crown, grade them on the preparation of the root; then on the making of the band; then on the backing up of the porcelain tooth; then on the putting in of the post, and, finally, on the soldering and finishing. The result is that the student's work is under observation all the tmie, and he is not graded on something he has not done.

On the subject of terminology, there is much to be said, and I agree with Dr. Black that if it were arranged in an intelligible way, a great deal of progress could be made. We have too many names for the same thing. This is confusing, for many things have no name at all, such as the dry powder of plaster-of-Paris and the mixed plaster-of-Paris.

I wish to say to Dr. Cattell that we have followed for years with great interest what he has done. The prosthetic department this year in our school is stronger than ever. The Juniors are required to make thirty-seven specimens, that is, seven more than they had to make last year. Each student is handed a chart that tells them exactly what to do. It is graded from the simple to the complex, the gradation being gradual. So that when he comes to make a bridge he has all the details that enter into its making before him. He simply has the additional technic work of assembling them.

As to technic work, I think Dr. Knight will agree with me that the Junior year at his college could easily be doubled in the number of specimens to be handed in. The students should be kept in the prosthetic laboratory for three years. The Senior should not be excused from lectures in prosthetic dentistry; nor should he be excused from making specimens. He should be kept on that subject up to his very last day in school. In order to interest the Senior students and to show them that they are deficient in knowledge of prosthetic dentistry, we have inaugurated what we call the comparative method course. A slip of paper is handed to them on which is an engraving of a certain case. Say, it is the upper jaw, and the right superior bicuspid is missing, together with the left superior lateral. At the next meeting the class is asked to give me its ideas as to the reparation of this case. That is very interesting. One man gives you his ideas, which another man is asked to criticize, and so on, until they begin to realize that there are several roads that lead to Rome.

As regards the use of charts and diagrams, no one can overestimate their value as aids in teaching. The old idea that it was an evidence of incapacity to illustrate an article no longer is extant. Nowadays we save time by showing a picture. The student will quickly get at the method of doing things. The student should know what every step is for and what it leads up to and what it culminates in. I think the idea of having these specimens before the class is a very excellent one.

There is one other thought that I wish to give in connection with this work, and that is regarding attendance. Dr. Knight says that his Senior class of fifty had an attendance of 84 per cent, and that the Junior class of 60 had a like attendance; and that his Freshman class of about 90 had an attendance of 85 per cent. I am very glad that his school has a nine months' course. I am satisfied that those of us who are teaching thirty-two weeks or eight months could not have such a loss of attendance as sixteen per cent. Our attendance is between 92 and 95 per cent at least.

In regard to the tardy students, how are they treated? How many tardy marks are counted as an absent mark; I do not believe that this Institute ought to dictate, but it ought to strive to bring about a condition of affairs so that when a student comes from one school to another, we can grade him properly.

Dr. George B. Snow, Buffalo, N. Y. Dr. Knight gave us a good paper. There are many things with which I agree, but there are some things with which I can not agree. His scheme of attendance is good. It is something like Dr. Wilson used. He handed out a written slip containing a question which had to be answered, so that he had a perfect record of attendance every day. But some schools are not built so as to permit the passing out of slips without having another person in attendance to take care of them. I have found it a good scheme to have the seats numbered, and make every student occupy his own seat. Then all the teacher needs to do is to note what chairs are vacant, and the balance can be done in the office. This is done quickly and is a perfect method.

Didactic instruction before practice is good and should be given always. The student must have an idea as to what he is to do. It is well to have a series of models showing the work in progress, and have written instructions given out with each model. The student gets a card which he submits to the demonstrator, who punches a number corresponding to the number of the part of the work that is being done. This saves much talk on the part of the demonstrator, and the student always knows just what to do.

Notes of lectures should be insisted on. Students, as a rule, do not take enough notes. As for written examinations, I prefer to have more than two, making them a part of the final, and giving them without any notice whatever. It makes more work for the teacher, but I write out the questions and the answers in full, and have another teacher help me to look over the papers. In case of doubt, I decide.

Dr. Knight said that his students make models and put them on a hinge articulator, and that the Juniors use the anatomical articulator. I think it would be better if he used the anatomical articulator at the start. I never came to a realizing sense of what it meant to lose a lower first molar until I came to use the anatomical articulator. You get good occlusion with the hinge articulator, but nothing else. When you have lost the lower first molar, the second molar is allowed to tip over, and that lets the third molar loose and it is erupted in advance of the upper wisdom tooth, and the grinding surfaces of the second and third lower molars form an incline which interferes with the lateral movements of the mandible. If you have the anatomical articulator, you can see that this interferes with the lateral movement of the jaw, and in my own classes I have seen men who, as a consequence of the loss of the lower first molars, could not get anything but an up and down motion for mastication. It leads to this. If you can show the student what a lower first molar is worth, you have done a great deal. We are using anatomic articulators, but we really do not know all about them. I have copied some charts from an article published in The Cosmos, October, 1905, written by Professor Christianson, of Copenhagen. He makes the point that there are only two surfaces which can be moved on one another and remain in contact. You can have a flat surface or a curved surface, representing the arc of a circle, and he goes on to demonstrate that the amount of compensatory curve of the bicuspids and molars depends entirely upon the prominence of the Eminentia Articularis; and he further shows that the prominence of the Eminentia Articularis must be taken into account before a full upper and lower set of teeth can be correctly articulated. He decsribes his method very fully, and, as you can see from these charts, the articulator he employs meets all the requirements of any case. (Here Dr. Snow illustrated the working of the articulator by means of charts and drawings.)

I suppose that many of you have had occasion to repair a gum section plate and found a nasty mess under the sections, and yet that is what we are putting into patients' mouths all the time. This can be prevented. I have here two plates, one vulcanized in the ordinary, the other in a way I will describe to you. I commenced experimenting with rubber many years ago, after Seabury brought out his vulcanizer. He had a double chambered vulcanizer in which he used 120 lbs. pressure. He thought that this was all that was necessary to get rubber vulacnized well. I experimented and found that thick pieces, vulcanized as he directed, were spongy in the center, but that by reducing the heat I could make the rubber solid. If the mould had flat sides, the corresponding sides of the vulcanite piece would be concave. But when I did that I could not get a piece of rubber which did not shrink. Our Freshmen are required to make a rubber cube. They take red sheet rubber, cut out 9-16ths of an inch square pieces, place these one on top the other until they have a cube. This is placed in a flask, which is filled with plaster, so that the cube of rubber is embedded in a mass of solid plaster. This is allowed to stand until the next day to insure hardness of the plaster. Then, some vulcanize in the ordinary way, others at a low heat for a long time. When they get through they are quizzed about their work. The first thing to be noticed is that the corners of the cube, instead of being perfect, have little sharp fins on them, caused by the rubber exponding enough to burst the plaster, and if vulcanized at 320°, the sides of the cube are flat but the rubber is spongy. When rubber is vulcanized for a long time at a low heat it will shrink, and it is impossible to vulcanize one of these cubes and have the rubber solid to the center without having its sides concave. The black rubber shrinks more than the red. The more coloring matter the rubber contains the less shrinkage, the less tendency is there for the rubber to become porous and the less it contracts in cooling (Here Dr. Snow exhibited a number of specimens of vulcanized rubber to show the effects of high heat and low heat, of quick vulcanization, and of slow vulcanization.)

The usual way of preparing flasks for the vulcanizer is to cut gateways for the reception of the surplus rubber, cutting through into the cavity in which the plate is moulded; so that the rubber can escape freely, and the flask is bolted rigidly, so that it cannot open. The result is that a part of the rubber escapes into the gateways as it expands in heating, and when it shrinks is it vulcanizes, there is a deficiency somewhere; although it may be not always be perceptible.

If an encircling gateway only is cut, leaving the edges of the mould intact, so that there will be no escape for the rubber when the flask is closed, and some form of spring pressure is used upon the flask when it is in the vulcanizes, the shrinkage of the rubber in vulcanizing will be compensated for if the average thickness of the rubber is not over an eighth of an inch. If the plate is thicker, pieces of thin metal, proportionate to the thickness of the plate, should be inserted between the halves of the flask to prevent its closing completely, and the rubber should be vulcanized for half the required time. Then the vulcanizer is allowed to cool so that it can be opened, the thin pieces of metal are removed, so that the flasks can close by the spring pressure, and the vulcanizing is to be continued for the remainer of the time.

Vulcanite Dentures can be produced in this way in which there are no interstices for the lodgment of organic matter; which are sanitary.

I was asking one man the other day why he did not have some of his demonstrators attend this meeting. He said that they could not afford it. That is wrong. The demonstrators are the very men who should come here and receive the instruction which are given here, and see what the others are doing. These men can then go back home and give their students the benefit of these meetings. This year there are four representatives here from our college. If every school would send two or three men to these meetings, the influence of the Society would be even greater than it is now.

Dr. J. K. Knight, Boston, Mass.

Dr. Cigrand said he thought that we do not give our Juniors enough specimen work. We are placed somewhat differently perhaps than some of the colleges in that we have such a large amount of practical work. Our Seniors can not take care of all we have, and when a Senior has made two or three rubber plates, he does not want to make any more. Our aim is to bring our Juniors as rapidly as possible to the point where we can put them on practical work, and they are told that as soon as they can finish their specimen work they will be given practical work.

. Dr. Snow referred to the anatomical articulator. That seems to me is one subject where as prosthetic men we are weak. We ought to pay more attention to that and teach the anatomical method of putting up artificial work. I mentioned only one articulator, the Kerr, for the simple reason that up to the present time the Kerr articulator was the only one that had an attachment at the angle whereby you could have either a straight articulation or a compensating curve. With the admirable addition of the Snow face-bow and curve we are able to reproduce most accurately the work in the mouth. We have not as yet employed this method in the Freshman year, because it is a little complicated, and the students can not understand it very readily.

REPORT OF THE COMMISSION ON NOMENCLATURE.

The commission authorized and appointed a year ago to undertake the compiling of technical terms employed in the study and practice of dentistry, together with their pronunciation and definition begs leave to submit the following as its first report.

In view of the difficulty in finding members of this body who were willing and who felt themselves qualified to undertake the detail work necessary your commission decided that it would be well to limit the subjects for the first year to Prosthetic and Ceramic Dentistry.

Dr. Geo. H. Wilson, who read a valuable paper on Prosthetic Nomenclature before the National Dental Association at Atlanta in September, kindly consented to undertake the work of preparing a more extended list of terms and definitions on the same subject for the use of our Commission and his paper is appended to this report.

The preparation of the list of terms and definitions pertaining to Ceramic Dentistry or Porcelain Work was undertaken by Dr. J. Q. Byram, the result of whose work you have just heard read.

It is desired that both of these reports shall be freely discussed by this body at this time in order that a consensus of opinion may be obtained, if possible.

According to the resolution adopted at our last meeting, these lists, after we have considered them, are to be printed and sent to the various dental colleges, journals and societies for further discussion and suggestion and a year hence your Commission hopes to present for your consideration and adoption the full list of terms on these two subjects as amended and revised in the interval.

As an encouragement for this work of our body we desire to call your attention to the fact that the Medical Profession has come to feel the need of revising its nomenclature and placing it upon a more scientific basis.

By a singular coincidence, the same year in which the special Committee on Nomenclature of the American Dental Association made its first report to that body in 1895, the European Anatomical Society, meeting in Basle, Switzerland, also received its first report on the revision of Anatomical Nomenclature, which was adopted and sent out to the profession.

The motives that prompted their work were so similar to our own that we feel warranted in incorporating in this report a few brief statements copied from theirs.

"The Basle Anatomical Nomenclature is the result of an earnest concerted effort to systematize and simplify a nomenclature which has grown in haphazard manner, become burdened frequently with multiple designations for one structure, and in general has deteriorated in scientific accuracy and value.

"The names are all in correct Latin and have been selected by a group of the most distinguished anatomists in the world, working six years at their task, as the shortest and simplest available terms for the different structures; the majority of names were already in use in the various standard text-books, but some of them were selected from anatomical monographs not considered in the text-books, and a few of them are brand-new terms, introduced into the list, where an examination of the literature and of anatomical preparations showed that none of the names hitherto coined was satisfactory.

"One name is given to each structure, and the mass of synonyms which encumbered the text-book can thus be swept away.

"Even more important is the exclusion from the list of all obscure or ambiguous terms, each name employed having a definite and easily ascertainable meaning.

"No attempt is made to limit the language of research, but only to supply a list of simple terms, free from ambiguity, for common use. Simplicity, accuracy and serial connection will be favored by the uniform and consistent use of this system."

In conclusion, your Commission would recommend that the subject to be taken up for the coming year be Operative Dentistry and Orthodontia.

Furthermore, we would call attention to the fact that if the report and list of terms now under consideration are to be printed and sent out to schools, journals and societies, an appropriation of about $50.00 should be made at this time.

Respectfully submitted,

S. H. GUILFORD, Chairman
J. B. WILLMOTT.
TRUMAN W. BROPHY.
} Commission.

PROSTHETIC NOMENCLATURE.

BY GEORGE H. WILSON, D.D.S., CLEVELAND, OHIO.

Certainly there is need for revising, and in some respects, constructing dental nomenclature. In appointing a commission for this purpose, the Institute of Dental Pedagogics has undertaken a laudable work; one that should in every way possible be supported and encouraged by the entire profession.

It seems to the writer that three rules should be established: 1st.—That all papers and discussions of words, terms and definitions shall be considered as submitted to the commission as material for their work. 2nd.—That so far as possible names shall be broad general terms. That is, not a specific term defining a definite idea, such as we may entertain of a subject to-day; but one that is elastic enough to cover future ideas regarding the subject. Otherwise the term may become incongruous and perhaps soon again need revising. As illustration: Prosthodontia is a term that has been accepted by some as a proper name for a department of dentistry, and means literally, to restore teeth; while the profession is fast learning that the department includes not only restoring the teeth, but the anatomy, harmony and expression of the lower half of the face. Prosthodontia is a specific term to which a general definition is given, while Prosthesis, noun, meaning restoration, is a general term susceptible of any specific definition being assigned to it that the status of the science may require; and not make incongruous the nomenclature. 3rd.—Special dental definitions to be formulated for all general terms and so far as possible a definite definition be given to all terms. Illustration: Prosthesis is a general term and is applled to the restoration of any part of the anatomy, but the special dental definition would be: The science, art and esthetics of restoring a lost dental organ or organs and their associate parts with an artificial substitute. This is a special and a definite definition of a general term.

We desire to enlarge upon and emphasize rule two, "That so far as possible names shall be broad general terms."

This is not a new idea, for others have made suggestions along this line for many years. Thus we have the derivatives of stoma, as stomatology, stomatological and stomalogist; orthopedia, from orthos, straight and pais, child, is a term that has been used to express a broader idea than is expressed by orthodontia (straight teeth), in correcting the irregularities associated with the teeth;

also, oral surgery is a broader term than dental surgery; also prophylaxis than cleaning teeth; and prosthesis than prosthodontia.

The dental pofession is often criticised by its votaries for its tendency to narrowness and not being able to see beyond the mechanical treatment of teeth. There is, alas, too much truth in this criticism. It should be compulsory for the teachers of dentistry (teacher—anyone who imparts ideas) to broaden the dental horizon. One way by which this can be done is through an improved nomenclature. Thus it is evident this idea of broadness in dental terms has been more or less in the mind of the profession for some time; and can now, and should be carried to its logical conclusion by the Commission.

The writer has no sympathy for the spirit of compromise; nor reverence for terms because they are ancient and perhaps were introduced by renowned scientists, unless the term has inherent merit. A misnomer should no more be retained in modern nomenclature than an exploded theory, though of worthy lineage, should be retained in modern science. While modern dentistry is considered a young profession it is not so youthful but that it has gained much respect, as a science, from the public, and greater respect may be had by improving its science. It is evident the more perfected the nomenclature the easier it is to impart knowledge; therefore every laudable effort made to improve the nomenclature will be an aid to the science of dentistry. If perfection is to be striven for, all words and terms and definitions must be carefully considered and adopted only on merit, not through compromise or because of euphony or lineage; but because they comply with philology and the rules established by the commission.

We present certain words and definitions with our arguments, and trust they will be discussed so that progress may be made in the direction of prosthetic nomenclature. We have presented the preceding thoughts desiring that the words and definitions to follow shall be severely scrutinized and rejected if they do not meet the requirements, and a better one introduced.

Various names have been applied to this department of the profession; Prosthesis, Prosthetic Dentistry, Prothetic Dentistry, Prosthodontia and Mechanical Dentistry.

Pros′-thes-is. (Stand. and Gould.) Pros′-the-sis (Com. '95). Gr. Pros, to, tithemi, place, hence to place or restore, restoration. Defined the making of artificial parts and fitting them to the body, as artificial teeth, cork legs, glass eyes, etc.

What authority the Committee of '95 had for changing the pronunciation from pros′-thes-is to pros′-the-sis does not appear, but certainly it is much easier to pronounce.

This noun was probably long used by the medical profession before it was taken up by the dental, but its use is very limited by the mother profession compared with the dental, therefore it seems no injustice if the latter profession should appropriate and give it a special significance. It is comparatively a short word and is generally used throughout the profession especially in its adjective form to denote making and inserting artificial dentures. It is a general term, therefore is capable of assuming any shade of meaning the age may require, hence the writer believes it is the best term yet suggested for this branch of the profession.

Definition.—Prosthesis is the science, art and esthetics of restoring a lost dental organ or organs and associate parts with an artificial substitute. Science is the classified knowledge of the subject, art is the skillful doing of the work, and esthetics is the idealizing or harmonizing of the restoration.

The term or name accepted should not be confined to the teeth, because to-day they are only a small part of what is covered by this department of dentistry. Appliances for cleft palates, dental splints, even lips and noses may be required of the dental prosthetist. However, the most important esthetic service the dentist is required to render is to restore the contour and expression of the lower half of the face.

Pros-thet′-ic Dentistry: Is a proper term, but long and rarely necessary, especially if the appropriating of prosthesis is approved.

Pro-thet′-ic Dentistry.—Pro-thet′-ic, adjective form of Proth′-is-is; pro, before, tithemi, put or place.

A term rarely used and should not be in the dental vocabulary.

Pros′-tho-don″-tia.—From two Greek words, prosthesis and odontia, and means to place tooth, but as appleid to dentistry is made to cover all work done by the prosthetist.

The derivative is very good, but literally it calls attention to the minor part to which is it applied; therefore is misleading and tends to make ignoble this most complicated part of our profession. It is a specific term, therefore can not so readily assume the new ideas of a growing science as could a general term.

Mechanical Dentistry.—The first name given to prosthetic dentistry; but should now be restricted to the work done in the laboratory, whether for the prosthetist, orthodontist or operator. The mechanical dentist works for the dentist, not for the patient.

Cast and model are terms that deserve careful consideration.

Cast.--The Standard Dictionary defines cast under the heading mechanics, as "A reverse copy in plaster of Paris or similar material, of a mold; usually distinguished from a casting which is of iron or other metal or alloy. An object founded or run in or as in a mold, as of metal, plaster, wax, etc."

In dentistry cast may be defined as: A reproduction in plaster of Paris or its compounds of an object or part, made from an impression or mold. Casts are used to give their negative likeness to an artificial denture, while a model is used to produce a positive likeness.

Model.—From modus, measure. An object representing accurately something to be made or already existing. A material pattern of natural, heroic or diminutive size. In sculpture the plaster or clay original of a work to be executed in stone or metal. A person who does duty as a copy or pattern for painters or sculptors.

A sculptor may idealize his living model; but his workmen must exactly copy the model he has made in clay. (Stand. Dic.)

In dentistry: A plaster model is used to make a metal casting or die. Wax models are to be reproduced, or their outlines retained in the completed work. Models are extensively used in technic work. Plaster models are never used in vulcanite work.

Model is often improperly used for cast. This applies to other departments of dentistry as well as prosthesis.

Dental Arch.—In dentistry applied to the curve made by the upper or lower teeth.

Arch is not an appropriate term to apply to the alinement of the dental armament, because when the teeth are in normal use they are in a horizontal position, while arch conveys the idea of perpendicularity, and is too often applied to the vault of the mouth.

The writer would suggest as a substitute for Dental Arch, Dental Curve.

A curve is a line continuously bent so that no portion is straight; a line that everywhere changes its course.

In medicine, curve is used once, "Curve of Carus" (in obstetrics.)

Dental curve would be defined as: The curve or bow formed by the alinement of the teeth.

The different portions of the Dental Curve would be called and described as:

Alinement curve.—The line passing through the center of the teeth mesio-distally.

Labial curve.—From the distal surface of one cuspid to the distal surface of the other cuspid in the same curve.

Buccal curve.—Buccal surface from cuspid to distal surface of third molars.

Compensating curve.—Occlusal surface of bicuspids and molars

Curve would better convey the idea of an imaginary line, while too often the teeth or even the alveolar process is meant instead of the line described by the teeth, when arch is used.

Cuspid.—This is an anatomical term, but because of its great importance and teaching and practicing prosthesis it seems apropos to discuss it in this place. Cuspid is derived from the Latin word cuspis, point, and is applied to the four conical or pointed teeth. The name is descriptive and not confusing, it is short and not offensive to refined taste. It is certainly the most desirable one of the four names struggling for an existence, cuspid, cuspidati, canine and eye tooth. It is true our standard anatomists cling quite tenaciously to some of the terms of the dark ages, but that is no reason why a modern science should adopt a faulty diction when a better one may be had for the choosing. Many of the schools are to-day using the term exclusively. It is quite possible that cuspid is more extensively used by the profession to-day than canine. If the term cuspid is adopted as the name for the third tooth from the median line in the dental armament, then consistency will require that we shall call the eminence and fossa cuspid; but the terms will be self-explanatory, so no real objection can be urged upon that score.

Dummy.—Is in common use in the dental profession as a name for the substituted teeth in a bridge. The word dummy is not found in the vocabulary of Gould's Medical or Harris' Dental Dictionaries, nor is the word given a dental significance in the Standard Dictionary. As appiled it is a meaningless and clumsy term.

At the 1905 meeting of the National Dental Association, Dr. W. Storrer How used and endorsed the term Substitute and its abreviated form Sub. for the teeth filling the span of a bridge. This term is certainly worthy of consideration.

Flasking.—In cast metal dentures the cast and model plate are encased in a flask with a suitable compound; in vulcanite and celluloid work the cast and model plate are encased in a flask with plaster of Paris, and is called flasking and is said to be flasked.

Solder work encased in a protecting substance without a flask is said to be invested.

Flexible vulcanite.—The '96 Committee preferred flexible vulcanite to velum rubber and defined it as Vulcanite, which is soft and extremely pliable after vulcanization, containing less sulfur than hard vulcanite.

All rubber when properly vulcanized is more or less flexible, therefore the term "flexible vulcanite" is confusing. Velum rubber, before the application of heat, and velum vulcanite after the application of heat, leaves no question in the mind of the dentist what is meant, and, it seems to the writer, should be accepted as the choice until something better is suggested.

The Commission of '96 included in their definition "and being vulcanized at a lower temperature than hard rubber." This implies a mistaken idea, as the temperature in vulcanizing either variety should be the same. The thickness of the mass only governing the temperature. The velum rubber will require less time to be converted into vulcanite because there is less sulfur to combine with the hydro-carbon; but no harm is done if the velum rubber is subjected to heat the full length of time required for hard vulcanite.

Impression.—An imprint of the edentulous ridges and palate or teeth in some suitable material, such as beeswax, modeling compound or plaster of Paris. Com. '96.

A new definition: A negative likeness of an object or part taken in a plastic material, from which a cast or positive likeness may be produced.

Impression tray.—Tray preferred to cup. Cup conveys the idea of symmetry of form with a base on which to stand, and holding capacity; while tray conveys the idea of indefinite form, a utensil having flanges and a capacity to hold and carry.

Line.—Any slender mark or band.

Median line.—An imaginary line on the surface of the body between opposite symmetrical halves. The middle line dividing the teeth. Black.

Lip Line.—The line defined by the lips closed and at rest.

High lip line.—The line defined by the upper lip when elevated to the extreme by muscular action.

Low lip line.—The line defined by the lower lip when depressed to the extreme by muscular action.

Maxillary.—Pertaining to the maxillae or jaws.

Maxillary surface.—The surface of a tray, impression or artificial denture that rests upon the maxillae, either upper or lower. (O. A. Weiss.)

Abutment (a-but'-ment.)—In mechanics, any relatively immovable part. Dental—the anchor tooth for a bridge. Preferred to pier or anchor.

Abutment crown.—The part of a bridge attached to the abutment. Preferred to anchor or pier crown.

Abutment used as a noun refers to that to which the bridge is attached; the adjective refers to that by which the bridge is attached.

Porcelain (pōrs′-lăn).—Pottery is divided into three classes, earthenware, stoneware and porcelain. Porcelain is subdivided into three classes, hard, natural soft and artificial soft. Dental porcelain belongs to the subdivision hard porcelain. Hard porcelain is kaolin and quartz with feldspathic glaze.

Dental porcelain may be defined as: A solidified suspension of one or more unfused silicious substances in a fused silicate.

Porcelain is high or low fusing dependent upon the quantity and quality of its basic ingredient.

Any hard porcelain becomes glass when there is fusion of all its essential constituents.

Dental porcelain is a very interesting subject to our profession at this time and one in which the nomenclature is very deficient. However, we know that the materials we use and our products must belong to one of, or both of two well known products of manufacture, porcelain and glass. No one knows the beginning of these materials. The cruder forms of porcelain pottery is prehistoric. So far as we know the real porcelain originated with the Chinese at a very early period.

We read also: "Nothing is known, with certainty, concerning the invention of glass, which dates from the earliest antiquity. The oldest specimens are Egyptian, and we possess specimens of opaque glass bearing the name of the queen Hatasu of the 18th dynasty, 1445 B. C. Transparent glass does not appear earlier in Egypt than the 26th dynasty, about 750 B. C.

With materials as old as these we know that we as dentists are not going to discover any new material, combination or process, but by study we may learn what others have known and possibly make a new application of some old facts. We way also perfect the material for a definite purpose, but we must remember that porcelain is porcelain and glass is glass, and that we should not do violence to the arts and sciences that have been developing through all ages.

We know that the arts consider there are three varieties of porcelain, hard, natural soft and medium soft.

Hard porcelain consists of kaolin and silica with feldspathic glaze.

Natural soft porcelain, a body of kaolin and calcium phosphate coated with a lead and boracic acid glaze.

Artificial soft porcelain, a body resembling glass, consisting chiefly of alkaline salts and coated with lead glaze.

Glass is a chemical salt, consisting of silicic acid (quartz) and one or several of a large number of metalic oxides for its base.

Chemically speaking, there are two other acids that form glasses boracic and phosphoric, but they are not considered in the arts.

Dental ceramics is certainly at the present time in a very chaotic state; and it would be an impossibility to form a definition that would describe all the stuff placed upon the market under the name of Dental Porcelain. Therefore it seems best to form such a definition as previously given, as it is in keeping with the knowledge of porcelain in the arts and sciences, and marks the distinction from glass.

During the past year or so Dr. Byram has called attention to a very important feature in fusing porcelain; thus avoiding the conversion of the porcelain into glass.

Sweat.—-To send forth, exude or prespire. Applied in dentistry to the uniting of two pieces of metal by heating and without solder. It is not euphonius, but describes the operation.

Autogenous (au-toj′-en-ous).—Greek, self-producing. The method of soldering to which this term is applied is brought about by high heat, therefore is not self-producing. This term was preferred by Dr. Guilford in his paper on nomenclature at the Fourth International Dental Congress.

Weld.—To unite or consolidate. This term implies uniting with force either with or without heat. It should not be used as synonymous with sweating and autogenous soldering.

While the words are not pleasing, sweat and sweating are the most descriptive, therefore should be adopted.

Resorption, and not absorption of the alveolar process, is a term that should be used by the prosthetist. Absorption is best applied to the physiological process of adding nourishment, while resorption best describes the process of removing waste tissue.

The last word to be considered in this paper is the troublesome one "bite." The word is of Anglo-Saxon origin and means to split. The term is in common use getting the relation between the jaws in constructing artificial dentures. There are two methods for accomplishing this operation; first, by placing a large mass of soft wax in the mouth and requiring the patient to close upon it, or bite into it; the other one is by the base plate and molded rim of wax or modeling compound method.

The first method is known by various names as squash, mush, and hunk bite. No matter what the descriptive adjective may be it certainly can be no more inelegant than the process it describes. There are places where this method will well answer the purpose, and "bite" perhaps is the best descriptive word we have for the operation. Therefore the writer would recommend that the word be retained and restricted in its use to this method of occluding the teeth.

The second method, consisting of the base-plate and the wax or modeling compound rim, serves a far greater purpose than the bite. They should be carved to give the periphery of the plate the cuspid eminence and the incisive and cuspid fossae, the contour of the cheek and lip, including the profile contour, the median line, and the lip line and the high or low lip line, also the occlusion. In fact they are a model in outline of what the finished denture is to be, therefore the writer would recommend the term wax (or modeling compound) model be used exclusively for this operation.

Bite, defined.—A mass of plastic material, usually wax or modeling compound, upon which the teeth or jaws are closed and designed to give their vertical relation.

Wax model (or modeling compound), defined.—Occlusal and contour models used in constructing artificial dentures.

Discussion.

Dr. S. H. Guilford, Philadelphia, Pa. I would like to have the members say whether they know a word of that would be a suitable substitute for the term "dummy."Another question arises with regard to the terms "model" and "cast." I have a great many plaster-of-Paris reproductions of mouths that contained irregular teeth. Are these models, or are they casts? Can we simplify matters by using the word model only and dropping the word cast?

Dr. G. V. Black, Chicago. It seems to me, that their ought not to any difficulty about the words model and cast. Almost every model is a cast, and we may use a cast as a model. If we use the cast to represent something, it is a model. Every plaster model is a cast, and that is true of any other casting. If we carve the model it is not a cast.

A great deal of work has been done on the subject of nomenclature in other professions than ours. We can not legislate here that the work of this committee shall be accepted. Our legislation will be of no consequence whatever. The only way that we can make this binding is by the consent of every writer on dental subjects. If we can get a sufficient number to consent to pledge themselves to use the words as proposed by the commission, it will go, otherwise not. That is the plan which has been used in botany and in natural history, in which the nomenclature is definite. Every writer on these subjects was consulted, and their consent obtained. It would seem almost impossible to get the consent of every man who has written on dental subjects during the last five or ten years; and yet that is the only way to make the nomenclature definite. I would not bind myself to support in all its details the nomenclature of any commission unless it was derived from the consent of every writer. But the repetition of this, the bringing of it continually before the profession is an important matter. Some day we may arrive at the point where we can get the consent of every writer in dentistry.

The same difficulty occurs in medicine, where there are so many writers that it is impossible to secure the consent of every one.

If you will compare the more recent writings with the older ones you wil find that a fixed nomenclature is gradualy being adopted. This shows that nomenclature is controlled mostly by certain writers who have been very careful in the use of words and names. The work of this commission is bound to have its effect, but we can not legislate and obtain a satifactory nomenclature without consulting these writers.

Dr. A. E. Webster,
Toronto, Canada.

With reference to getting the consent of publishers, we know that every publishing house has its own rules as to spelling and punctuation, and it is impossible for any one to change the spelling without consulting the publishers of dental journals and books. Therefore it is necessary that this commission get in touch with the publishers and get them to co-operate in establishing a definite nomenclature.

Dr. J. B. Willmott,
Toronto, Canada.

It is a very important matter that the Commission should have some idea as to what it is to do. I do not look at this matter from the same standpoint as does Dr. Black. We are legislating for teachers. What are we going to teach, and how are we going to convey ideas to the student? The teachers and not the writers are the men to determine what terms to use.

Dr. H. T. Smith, Cincinnati. Ohio. I have here a circular of a recent publication, known as the B. I. N., scheme of Medical Nomenclature adopted at the Basle meeting of the International Medical Association, setting forth about ten thousand Anatomical terms which indicates that the medical profession has been struggling with the same question as that before the dental profession. It seems to me that this body should eventually publish a revised nomenclature which could be presenetd to the profession. The commitsee should be continued and prepare partial reports for publication from time to time until a complete scheme of Dental Nomenclature is obtained.

Dr. T. W. Brophy, Chicago. The circular to which Dr. Smith called attention means a great deal. It means that the nomenclature of the medical profession is being changed to conform to advanced ideas. So many new terms have been introduced into the literature of the medical and dental professions in the past decade, that it is necessary to have a Commission take them up and prepare a correct nomenclature. It seems that every man has his own nomenclature, and that every school uses special terms.

Regarding the work that Dr. Guilford has done so well. The paper he read at the New York meeting last year was the great feature of that meeting. Everybody was interested in it, and he was made the head of a committee for the purpose of taking up this matter. I am glad that he is to continue with this work and give us a nomenclature that will be right. He should make this his life mission.

The trend is to have a better nomenclature. In the medical profession Dr. Barker has taken up this work and when he has it completed it will be the work of a master. In the International Federation there is a Committee on Nomenclature, and the work of that Committee will be in harmony with the work that is being done here, and I hope that before any report is finally adopted, a Conference will be held by these two committees for the purpose of harmonizing terms. There is no work that this Institute can do that will be of so much value and importance to the profession, and especially to the younger men, who are in a state of confusion regarding terms because of the lack of harmony that exists. We must have something that is based on scientific grounds. As a member of this Commission, I feel that I owe every thing to Dr. Guilford, because he has done all the work. It is not possible to get something ready in a short time, but in another year we will have something that will be worth discussing. It will be one of the important features of the coming meeting.

Dr. George W. Cook, Chicago. This is an important question. The anatomical commission which has adopted certain words and terms has been severely criticized by the commission appointed by Oxford some years ago, when $170,000 was appropriated to be used in the consummation of a general nomenclature for all sciences as well as for literature. I believe that Professor Murray, of Oxford, is the head of that Commission, and he would be of considerable assistance to our commsission in settling many questions that may arise in their minds. There are in this country two or three members of that commission, and they have done a great deal of work. The terms now used in botany are nearer perfection than any in use in other sciences. The adoption of these terms does not mean necessarily that they can not be changed when the future demands it. They have changed and will continue to change.

I believe that what has been accomplished by this commission is worthy of the Institute, and I for one am very much pleased with the report of the committee.

Dr. G. V. Black, Chicago. It is almost useless for us to adopt any system of nomenclature without a consideration of at least two other languages, French and German. All nomenclatures that have been developed in the United States have become quite common in the French language. In the German they are generally understood and are used very considerably, but the Germans are very tenacious as to the use of their language, and it is well-fitted for making terms, better fitted than any other language. Hence, the Germans cling to their terms and yet the terms we use we also used considerably in the German language. Nearly every book and journal published in the German language shows this: They contain more and more of the Latin derivatives that we are using, displacing the vernacular terms used heretofore. There is a very good indication of the progress that is being made, and of the linguistic correctness of the terms developed by us in the United States.

There will also be a certain number of things coming up for which we will not find a word in the Latin of Greek, and we will be compelled to introduce and use some vernacular or purely English term. It is very much easier for a Frenchman to adopt a word drawn from the Latin than one drawn from the Saxon language. All these things require careful consideration. We are not working for the English language alone, but for the French and the German, and by working in harmony with these languages we will also be in harmony with the Norse and other European languages. It may be well to have some consideration for the Norse languages and also perhaps for the Russian. Where we can not find a word, as, for instance, the word dummy, that can be used by other nations, we ought to try and get a substitute. The old Saxon words are the best always, because everybody can understand them. We must be careful, however, in the choice of our terms. Many things must be considered.

Dr. T. W. Brophy, Chicago. Most of us know that Dr. W. D. Miller, of Berlin, who has a reputation wherever dentistry is practiced, will soon be one of us. He is coming to America, to be the head of the University of Michigan Dental School. He is a master of German, French and English, and we will find in him a valuable assistant in helping us out in the work Dr. Black just mentioned. The Italian and Spanish languages must also be considered. If Dr. Miller becomes a member of this Commission (he is a member of the Committee on Nomenclature abroad) we will get out of this the best way possible. We can make use of many terms of the proposed by the Medical Commission, but we will look forward to see the work of this Commission, and this, together with the work that is being done by the International Commission will give us exactly what we want.

Dr. S. H. Guilford, Philadelphia. Dr. Black said that we could not get a system of nomenclature and force it on the profession; that we must get the consent of the writers. That is true, but the profession is now ripe for this very thing. Dentists are eager for a decision as to terms and many of the dental journals as well as the dental schools have intimated to the Commission that when we have decided on a certain nomenclature they will adopt it. If the journals and the schools adopt it, the profession will do likewise.

Dr. Webster said that much depends on the disposition of the publishing houses. That will be brought about in another way.

Several years ago, when this subject was first brought up, Dr. Gould, of Philadelphia, was anxious to incorporate in his medical dictionary a number of dental terms. He applied to Dr. Burchard, who was then living, and he gave Dr. Gould a list of terms. These can be found in his dictionary. So that I believe there will not be any difficulty at all in getting the publishers to adopt the terms we decide upon.

In regard to the different langauges, the medical profession has taken most of its terms from Latin, and some from the Greek, while other terms are hybrids, but they have been accepted. We do not need to pay much attention to the modern languages, because they are living languages, and are subject to change from year to year. When we have a specific word that answers our purpose, there can be no objection to using it. Quite recently I came across the word kaolin, and although I was familiar with it, I nid dot know its derivation. I found it to be a Chinese term (kao Ling), and means "high ridge." Probably the clay was first discovered in the form of a high ridge, and that term has been accepted as expressing a definite thing. Where there is a new word to be coined, it is better to take it from the dead languages.

A METHOD OF TEACHING THE PRINCIPLES OF FILLING TEETH WITH PORCELAIN.

BY DR. J. Q. BYRAM, INDIANAPOLIS.

In presenting a paper on the subject of Methods of Teaching the Principles of Filling Teeth with Porcelain, the writer feels his inability to outline an entirely satisfactory course, and he realizes that methods of teaching are transient. The desire to give our students the best methods at our command necessitates changes; and the method of to-day may be improved to morrow, while the method of yesterday may be obsolete to-day.

Methods of teaching are conditioned, in a measure, by the individuality of the teacher, and that method which may be most successful with one teacher, may be a poor one with others. The ability of the teacher to present his subject so that his pupils are interested in their work, and comprehend the value of the subject matter, is essential to successful teaching. A method of teaching may be excellent, but the student must realize the value of the course presented before he will receive the greatest benefit therefrom.

It is not sufficient merely to teach the student how to perform the operation, but he should know why the operation is performed. The teacher who can enthuse his classes so that he stimulates thought on the part of the students, and developes their reasoning faculties along with the development of their skill and dexterity is successful. Any method by which he may accomplish this end may be considered a good one.

The writer feels that he would be showing his good friend and confrere, Dr. Hart J. Goslee a discourtesy should he attempt to cover the whole field of Dental Porcelain Art, for he very ably covered this subject in a general way, in a paper entitled "Porcelain Technology," which was read before this association at Buffalo, in 1903, and was published with its proceedings for that year. He shall therefore limit this paper to a method of teaching porcelain inlay work. This course commences at the beginning of the senior year, and consists of two lectures per week,with five hours per week devoted to the technic course. It requires about eighteen hours of didactic and sixty hours of technical instruction to complete the porcelain inlay course.

The student should be impressed that a good porcelain inlay worker should have a keen observation, a thorough knowledge of the principles of inlay work, and of the properties of porcelain, a mastery of the technique and a knowledge of the principles of color formation, with the eye trained to detect the delicate hues of a color. While it is desirable to give the student a thorough theoretic knowledge of porcelain inlays, it is impossible, however, to teach this branch of the dental art wholly from the rostrum, so the didactic and technical teaching should go hand in hand.

The first lecture is a general consideration of porcelain. The student should know something of its history, in general, and as much as it is possible for him to obtain of its dental history. The names of Plantou, Hall, Allen, Wildman, Moffet, Ambler, Tees, Close, Haskell, Land, Jenkins and others should be familiar to every dental student.

That the student may better comprehend certain terms used in the porcelain art, he is given the folowing glossary. In presenting these definitions, the writer wishes to acknowledge the assistance of Drs. S. H. Guilford, G. H. Wilson, V. W. Gilbert, J. D. Hodgen and others.

DENTAL PORCELAIN.—A material composed of silicon oxid, the silicates of aluminum, potassium and sodium, which becomes a hard, dense mass by the application of heat.

SILEX.—The oxid of silicon, which is a white, highly fusible. moderately hard, crystalline substance.

KAOLIN.—The hydrated silicate of aluminum, which is a white, opaque, refractory clay, resulting from the decomposition of feldspar.

FELDSPAR (Orthoclase).—A silicate of aluminum and potassium with varieties in which the potatssium is partially replaced by the sodium. It is translucent, moderately a high fusing substance, and varies in color.

FUSION.—A chemico-physical change produced by subjecting porcelain to sufficient temperature to cause molecular rearrangement, accompanied with partial vitrifaction, and a glaze of the surface of the mass.

SOFT BISQUE.—A state resulting from heating porcelain sufficiently to slightly harden it, but yet not enough to produce shrinkage.

HARD BISQUE.—A state resulting from heating porcelain sufficiently to obtain shrinkage, but not enough to produce a glazed surface.

HIGH FUSING PORCELAIN.—A porcelain which requires more than five minutes to fuse, at a temperature of two thousand degrees F.

LOW FUSING PORCELAIN.—A porcelain which requires less than five minutes to fuse, at a temperature of two thousand degrees F.

PIGMENT.—Metals or their oxids, which, when added to porcelain and heated to a high degree of heat, will produce a definite hue of color.

FRIT.—An intense pigment, fused with feldspar and flux, and then ground to a fine powder, and used as a coloring material for porcelain.

GUM FRIT.—A frit whose pigment will produce a gum-appearing color.

PURPLE OF CASSIUS.—A compound of gold, tin and oxygen, used as a pigment in the manufacture of gum frits.

SPONGY GOLD.—A precipitated gold used as a pigment in the manufacture of brown frit with a reddish hue.

SPONGY PLATINUM.—A precipitated platinum used as a pigment in the manufacture of blue frits with a grayish hue.

FLUX.—A material used to increase the fusibility of porcelain.

BASAL INGREDIENTS.—Those ingredients which form the fundamental mass of the porcelain, viz.: silica, kaolin and feldspar.

Basal Body.—Porcelain composed of the basal ingredients and the pigment. This includes such terms as block body, tooth body, etc.

Foundation Body.—A basal body, the fusibility of which has been increased by the addition of a flux, and one which requires more than two minutes to fuse at a temperature of twenty-one hundred F.

Enamel Body.—A basal body with enough flux added to give it greater fusibility than that of the foundation body.

Foundation.—That portion of an artificial tooth, crown or inlay which takes the place of the lost dentin.

Enamel.—That portion of an artificial tooth crown or inlay which takes the place of the lost enamel.

Glaze.—A highly translucent, colorless, vitrifiable substance applied to the surface of porcelain.

The adjective basal, foundation and enamel, when prefixed to the term body, designate in a measure the composition and fusibility of porcelain. But the nouns foundation, enamel and glaze refer to the usage of the porcelain, without reference to its composition or fusibility.

Platinous Gold.—An alloy of gold and platinum, containing less than 50% of platinum.

COLORS.

Color is a sensation produced in a variety of ways, but pre-eminently by the action of waves of incomplete height on the retina; as used by artists, the right harmonious effect or full appearance produced by certain combinations of colors.

Tint.—A tone of a color produced by the addition of white, and white light to immaterial colors.

Shade.—A tone of a color darkened by the addition of deeper black pigments, or by the action of diminished light on immaterial colors.

Hue.—The excessive predominance of one color over another.

Purity.—The lack of mixture of white, black or any other color to a color.

Luminosity.—The property of a color to reflect light to the eye, and is therefore independent of hue and purity.

The composition of porcelain is then given due consideration. The preparation of the basal ingredients—silica, kaolin and feldspar, the preparations of the fluxes and pigments, and the methods of compounding these materials are here presented to the students.

The properties which each substance entering into the composition of porcelain imparts to it are studied and the various forms of porcelain are compared. The distinction between high and low fusing porcelains, with the relative properties of each, is taught at this time. The shrinkage of the material and the principle of changing the ingredients from a powder to a vitrous mass are not overlooked.

THE FOLLOWING DEDUCTIONS FROM EXPERIMENTS OF FUSING PORCELAIN ARE GIVEN THE STUDENTS:

1. Porcelain has no definite fusing point.

2. By prolonging the time of exposure to heat, a thoroughly fused porcelain may be obtained at a comparatively low temperature.

3. That porcelain fused at high temperature for a long time will lose its color, but if fused at a low temperature for a long time, it will maintain its characteristic color.

4. That low fusing porcelains may be made of high fusing porcelains, by repeated fusings and grindings, but the properties are changed.

5. By repeatedly heating porcelain to the point of hard biscuiting, it will finally become fused and maintain its characteristic color.

6. If a piece of porcelain is thoroughly fused, then heated repeatedly to the maximum fusing point, it becomes overfused; and if it remains in contact with the maximum heat long enough, it fuses into a glass-like globule.

7. That porcelains containing a large per cent of flux are more easily affected by bubbles than those porcelains that are more nearly composed of the basal ingredients, and they should be heated more slowly.

8. Under-fused porcelain has a much duller hue, and is more opaque, while over-fused porcelain becomes lighter and tends to become more translucent. All the shades of a colór from normal to a light, may be obtained by increasing the heat above the maximum fusing point of the porcelain, but this is done at the sacrifice of its strength.

At this stage of the course, the technical work begins. The first operations in technics are to carve three or more teeth in modeling composition, 20% larger than the normal size. After they have been properly carved, sectional moulds are constructed of plaster of Paris, in which porcelain teeth are moulded. After the teeth are removed from the moulds, they are properly carved and fused. The student is next required to form rods of porcelain, by making cylinders from blotting paper and filling them with porcelain, from which he carves the crowns of three or more teeth, 20% larger than their natural size. This course instructs the student in the principles of mould construction, the manipulation of the porcelain, and it also familiarizes him with its fusing and permits him to study its shrinkage in a practical manner.

All must admit, I think, that the pioneers of dentistry, who began the development of dental porcelain, were more skillful in its manipulation than most of us at the present time. They were required to grind their materials, solve their formulae and compound the ingredients. They were required to carve the gum-section blocks and other special forms of teeth, the act of which developed an art that is almost lost to the dental profession to-day. The technique of moulding and carving porcelain develops the student's skill in its manipulation.

The phenomena of color is next studied in a theoretic and practical manner. The sources of light are also considered. The student is shown the distinction between self-luminous and illuminated bodies, and the distinction between white light and colored light. He is shown why light from the sun is said to be white light, while that from other sources is said to be colored. Color is studied as a sensation, usually produced by the action of light rays on the Retina. Such phenomena of light, as absorption, transmission, reflection and refraction are considered, and an effort is made to show these phenomena assist in the formation of colors. The distinction between transparent, translucent and opaque bodies is next studied. The power of pigments to transmit, reflect and absorb light is illustrated with transparent, translucent and opaque bodies. The phenomena of color formation by the mixing of pigments, then by their application in layers, is also studied. After considering the Brewster Theory of Color Formation, definitions of the tint, shade, hue, purity and luminosity of colors are given. The study of the various pigments used in the manufacture of dental porcelain, the colors produced by each, the process of combining pigments to produce various colors and the methods of increasing or decreasing the intensity of colors are also considered at this time.

The first technic work on color is done with water colors. Each senior student is required to purchase a water color outfit, consisting of the three primary colors (Brewster Theory), red, yellow and blue and a drawing book with white leaves. They are first instructed to show the variations of a color produced by decreasing the thickness of the layer of pigment. This is done by saturating the brush with the desired pigment, then varying the thickness of the layer on the paper. The next experiment is to make binary combinations. First, red and yellow are mixed in varying proportions, showing orange with a reddish hue and orange with a yellowish hue. The same experiments are made with red and blue, showing the variations of the hue of violet from violet with a reddish to violet with a bluish hue. Yellow and blue are next mixed, showing the variations in green from a bluish to a yellowish hue.

After the experiments of producing binary colors by mixing pigments have been completed, the next experiment is to produce the same colors by applying a layer of one primary color on the paper and after this has dried, the second primary is placed over the first layer. When the experiments with the binary combinations have been completed, experiments with the tertiary combinations are then made. Two primary colors are mixed and the third primary added in varying proportion to produce browns and grays. Black is also made from the three primary colors. At this time black and white pigments are introduced and the class is instructed how to tint by diluting pigments with white; how to sadden colors by the addition of black and how to combine black and white to make grays.

After experimenting with water colors, the student is next instructed to carry on a line of experiments in colors with porcelain. For this work, we use yellow, blue and dark pink, prepared by the S. S. White Company, and a special yellow prepared by Mr. Robert Brewster. While these colors do not match the spectral red, yellow and blue, and do not meet the requirements in an entirely satisfactory manner, they do permit the student to obtain results that prove to him that the formation of colors from pigmented porcelain involve the same phenomena of color formation that are involved in the formation of colors from other pigments.

A suitable mould, representing the labial surface of an incisor is constructed, in which the student can mould the various combinations that he is to make. He is instructed how to mould and fuse various combinations of red and yellow, red and blue, blue and yellow and also combinations of red, yellow and blue in varying proportions. After studying the phenomenae of color formation in porcelain, he is instructed how to make a shade guide for inlay work by combining his porcelain in definite proportions.

Before the technic work in colors is completed, lectures are are given on the general considerations of porcelain as a filling material; its advantages and disadvantages and its indications and contra-indications.

The construction of porcelain inlays involves the application of four sets of manipulative principles:

1. The preparation of cavities.
2. The construction of the matrix.
3. The selection, application and fusing of the porcelain.
4. The setting and finishing of the inlay.

An effort is made to show that each step presents series of mechanical principles, which, if not properly applied and observed will cause an imperfect filling.

As the lectures are given on cavity preparation, cavities should be prepared in extracted teeth for the technic work, followed by practical work in the clinic, and these should include labial, buccal; simple proximal and proximo-incisal cavities in incisors and cuspids, and proximo-occlusal cavities. Charts and models should be displayed so that he may comprehend all the fine points of detail in the preparation of cavities.

The student should thoroughly understand the difference between the inlay principle of retaining fillings and the methods of retaining fillings by grooves and undercuts. He should be impressed with the necessity of careful attention to detail in the preparation of cavities for inlays, and that the preparation of many cavities requires the sacrifice of sound tooth structure in order to secure the necessary retentive resistance, to prevent frail margins of porcelain or enamel, and to obtain proper color effect, and that actual angles, both on the margins and in the cavity are to be avoided. He is also shown how the cement will change the color of thin layers of porcelain or the enamel.

The selection of materials for matrices is given due consideration. The advantages and disadvantages of gold and platinum for matrices are considered. A demonstrative lecture is given on the various methods of constructing matrices of platinum gold and platinous gold and three general methods of constructing these are taught:

1. Burnishing directly into the cavity.
2. Swaging into a positive of the cavity.
3. Swaging over an impression of the cavity.

The advantages and disadvantages of each method are considered and the student is taught to combine the first and second methods for large inlays.

In studying the selection, application and fusing of porcelain for inlays, an attempt is made to show the practical application of the knowledge of colors. It is demonstrated how the intensity of a color is conditioned by the thickness of the layers, and that two or more shades of a color can be made from the same porcelain by varying the thickness. The cause of the variations of color noted after the inlay has been cemented, is studied. The cement is considered as an opaque lining which prevents the transmission of light through the tooth, but causes an absorption and reflection of the transmitted rays that are incident on the porcelain. A shadow is considered as that part of an object which receives but few or no rays of light. He is shown how a shadow is formed when light is incident on the teeth and lips, and partially excluded from portions of teeth.

A study of the colors of the teeth should be made before the porcelain for the inlay is selected. In the selection of the colors for inlays, the variation of the colors of the natural teeth is noted. The color of normal dentin is studied and found to be a hue of yellow.

It follows from this, that the foundation of the inlay should be a hue of yellow (if the tooth contains no foreign pigments) and the colors of the enamels, which overlie it, should approach the the colors of the tooth in their respective locations. The builidng of inlays in layers and the mixing of porcelains in such a manner as to obtain proper color effects, is now taken up. In mixing pocelains or in applying them in layers, it must be borne in mind that the formation of the color is primarily due to the power of the combined porcelains to absorb, transmit or reflect light.

The uniformity of colors in porcelain is partially dependent upon the accuracy of the fusing. It is difficult to fuse porcelain at a definite degree of heat without some means of measuring the degree of heat used. Many otherwise good inlays are spoiled in the furnace. Then, too, variations of the heat of the muffle will cause differences in the sades and the strength of the porcelain. Under-fused porcelain is of a darker hue and is less translucent, while over-fused porcelain is lighter and has more of a glass-like appearance.

The student is taught how to manipulate invested and uninvested matrices; he is also taught how to apply porcelain to the matrix by mixing it with water or alcohol, and how to prevent the porcelain from forming ragged margins. The tendency of the porcelain to warp the matrix in the process of fusing, and the various methods of overcoming this condition, are studied. He is shown how and why the different layers of enamel should only be fused to a hard bisque until the last fusing, when the colors are brought out in the final fusing.

He is impressed that very little finishing of the inlay is required if proper care is exercised in applying the porcelain. All margins of porcelain overhanging the enamel should be removed with cuttlefish disks and Arkansas stones. The effect of hydro-fluoric acid on porcelain is studied, and he is shown how to etch the inlay in order to insure better adhesion of the cement to the porcelain.

Both slow and quick setting cements are studied, and he is impressed that the cement powder and liquid should be mixed in difinite proportions and they should be thoroughly spatulated in order to obtain the greatest adhesiveness. The effect of the cement on the color of the inlay is again considered. The student is shown that when the inlays are constructed of a mono-chromatic porcelain, a cement which is the same color of the porcelain, but of a lighter hue, may be used for setting them, for the rays that are transmitted through the porcelain are not absorbed by the cement, but reflected to the surface with practically no change of color other than intensifying it. He is taught that a pure white cement would be the best for setting all simple proximal and proximo-incisal inlays constructed of multi-colored porcelain, because white bodies do not absorb light, but reflect it. The same rays that are transmitted to the cement would then be reflected to the surface, for white has greater reflective power than any other color.

Instruction is given in grooving cavities and in cleansing and drying them for the reception of the inlay. Demonstrations are given in the various methods of setting inlays and retaining them until the cement has crystallized. Also in removing the surplus cement and polishing the margins with small Arkansas stones.

I realize that the course as outlined in this paper is not an ideal one, and that it is open to many criticisms, but I hope it will elicit a free discussion, so that we may be able to formulate a course that will be of great assistance to all teachers of this branch of dental art.

Discussion.

Dr. W. T. Reeves, Chicago. I was very much pleased with Dr. Byram's paper, although I cannot agree with him in everything. As Dr. Byram outlined the technic for porcelain inlay work, the first impression I had was that he had outlined sufficient work to cover three years, instead of teaching the subject only in the Senior year There is a great deal of value in many of these points, but they had best be taken up in the Freshman and Junior years of the course. He has given much that is useful and instructive, but not of sufficient value to take the time away from the practical phase of the work.

The color illustrations and the work done by the students are interesting, but to my mind it would answer better if this were used by the instructor to force home a point he wants to make, not occupying the students time, by making him do the work. I also fail to see how it is of any benefit to the student to know the composition of these bodies. There was a time when it would have been well for him to know this, but not to-day. The dentist does not have to combine his own bodies. Manufacturers have entered this field of work and they really do the work better than we do it. The student's time should be employed to better advantage by teaching him how to use these bodies, rather than how to make them.

Again, the point the Doctor brought out as to the use of glass to illustrate the point of varying shades that can be produced by the thickness of the body used, is a good one, but I think he could accomplish this better if he had taken a piece of glass, one-half inch thick at one, and tapering down to a fine edge. This would show the different shades that might be obtained very nicely. The same thing is true of porcelain. We know that the color of any body depends on the thickness of that body. The students should be taught thoroughly how to use different kinds of bodies, high and low fusing bodies, how to use gold and platinum matrices, how to burnish and sweat, and so forth, giving him a thorough grounding in the work that will be of value to him, after he has graduated. Once he has entered on the practice of dentistry, he will vary the work to suit himself, as he finds that this or that method is better than the one he has been taught. There is no use in teaching a student all the methods, because that would be a waste of time. It is much better to teach him thoroughly all you can about these materials, and then let him choose the method of their use himself.

I think the same thing holds good in connection with porcelain.

I believe the time will soon come when the colleges will teach only those methods which are best for all kinds and grades of work; that is, the method that accomplishes the most. The student should have a certain amount of practical work, so that he will know what to do when he is confronted by certain conditions. I believe that the teacher should teach the student what he believes in, and induce him to accept the same belief, and turn him out capable of performing those operations to the best of his ability. Then the student can detremine for himself whether some other method than the one he was taught is the best. To attempt to teach a student all these methods leaves him in a condition where he is master of none. That will not benefit him any.

There is one point which I think will be very detrimental, regardless of the method adopted to teach the student, and that is, that a change in the color of the porcelain can be produced by by over-baking. I think the teaching should be entirely along the line of guarding him against producing any change of that kind, and that any changes made should be made by the porcelain used. I believe that the large number of samples the students make up for the inlay is a mistake. The fewer colors a person works with, if worked on the right principle, which is the laying on of the colors in layers, the sooner he gets results that are definite. If he has a large number of colors, he is more apt to select one that is close to the one he desires, and the result is that in using it in the same bulk as the sample he gets a different effect. If he had eight strong colors and learned to vary their shades, he would gain a difinite knowledge every time he baked, so that he would be able to reproduce or change results with a facility that would exceed what he could do if he had twenty-five or thirty different colors to select from.

W. L. Fickes,
Pittsburg, Pa.

It was with great pleasure that I met our friend, Dr. Byram, a few years ago; partly because he is such a good fellow, but principally for the reason that he had been making a study of the light problem in porcelain work, and was following the same methods of procedure adopted by me in my attempt to solve the same. I received at that time various suggestions which stimulated me to renewed effort; but I must admit that the problem is yet unsolved, by me at least. However, my time has not been entirely wasted, although, with the exception of a few minor suggestive facts, I have been unable to apply that knowledge to the practice of teaching.

Dr. Byram has offered a few ideas of a practical nature, which might well be adopted by all who teach porcelain art, one of the most valuable of which is requiring the student to do some color work with the brush; another being the use of colored glass by the lecturer. It might be useful to add to the latter exercise two tourmaline plates, showing transparency when their optical axes are parallel and opacity or blackness when they are crossed at right angles.

In the didactic course, the student should be told the source of color; how it is destroyed, and how the hues, tints and shades are obtained; the difference between inherent and transient colors; what pigments are, and the effects of their impurities, as well as what we might prove were it possible to obtain them in a perfectly pure state, etc. Even when using pigments which nearly represent the three primary colors, because of their difference in transparency, opacity, chemical constituents, or in some other qualities, they do not always mix so as to produce a perfect secondary color. Such facts as these should be taught the student, and principally those facts which will make him THINK. Thus, we might unconsciously produce the impetus which would lead someone to solve the shadow ploblem.

I can say nothing except in commendation of the paper. It contains matter which is in advance of the usual methods of teaching this subject, and Dr. Byram deserves the thanks of this Institute.

Dr. J. Q. Byram, Indianopalis, Ind. I would like to call Dr. Reeves' attention to the title of the paper, "The Method of Teaching the Principles of Filling Teeth with Porcelain." A teacher should teach principles and not individual methods. I have been attending the meetings of this society for nine years, and it has been principles that I have carried home and introduced, rather than individual methods. I grant that there are times when only the teacher's methods should be taught, but a teacher who teaches only his pet methods is not giving the student the advantage of a broad education.

The report came to me this morning that someone had stated that I did not teach what I had outlined in the paper. Another party said that because I am teaching porcelain work, I see nothing to be taught but porcelain. I wish to say that I teach all the technic work in the institution which I have the honor to represent. My porcelain course begins directly with the Freshmen, who mould and carve teeth, and continues with the Juniors who must carve all cusps for crowns. This preliminary work is shaping the course and leads up to porcelain work in the Senior year. I do not take time that should be devoted to other subjects to teach porcelain work. It requires three hours per week in the technic laboratory and they continue their clinical work uninterupted. The work is so arranged that it may be completed at times when the student is not engaged in other departments.

If students are required to work from the beginning of the term and not permitted to loaf for a few weeks, a great deal more can be accomplished. Some institutions do not put their students to work for two or three weeks after the opening. Our students begin their technic work the morning after the opening exercises, and I assure you that no time is lost until the end of the course. That is why we can accomplish all these things.

Regarding one or two things mentioned by Dr. Reeves: I do not go into the practical chemistry of compounding porcelain bodies. I said that the pioneer dentists who did compound bodies and carve teeth were more skillful in porcelain art than most of us are at the present time. (I am trying to acquire that skill.) I believe that if I teach principles and enough practical work, that the students may intelligently understand these principles, they will develope into better inlay workers than if I teach only methods.

Dr. Reeves told me that my paper was years in advance of the times, and when we change our courses so that porcelain practically displaces other filling materials, then the course as outlined will be a good one. I try to impress upon our students that they will earn the most of their living by filling teeth with gold and amalgam, and that porcelain is not intended to displace other filling materials, but only to take its proper place along with them.

A METHOD OF TEACHING ORTHODONTIA.

BY H. T. SMITH, CINCINNATI, OHIO.

For some years past the papers on Orthodontia presented to this Society have covered principally the Orthodontia Technic, so that I have taken the liberty this year of presenting a few more general considerations of the subject for your discussion.

While the subject of Orthodontia has been added to the dental curriculum in comparatively recent years, and still more recently (within two years) to the subjects required by some of the State Examining Boards, it has developed so rapidly and has been practiced so enthusiastically that it is now probably being presented to students up to its limitations as compared with the other dental studies.

Its teaching is naturally divided (as are most of our studies), into the didactic, clinical and technical parts. I take it that Orthodontia is essentially a Senior study, and we place it there because it seems to require a technical skill, judgment, and clinical experience which is not forthcoming from the lower classmen.

The teaching corps of this department is variously organized in the different schools. With an average class of say sixty students, the subject may be properly covered by two instructors, a practitioner-professor and a resident demonstrator. By the first I mean a dentist who brings to his classes the experience of a good office practice in Orthodontia. He should deliver the course of lectures and conduct bi-weekly clinical demonstrations on the subject. He should be assisted by the second, a demonstrator selected from the regular operative staff whose time morning and afternoon may be set aside for Orthodontia work. This demonstrator should be thoroughly en report with the professor in methods and ideas, following his course of lectures (without necessarily attending them), and receiving instructions from him, yet being responsible to the Superintendent of Clinics. This demonstrator should have charge of the Orthodontia Technic and of the daily practical cases.

A good dental clinic should furnish two practical cases to each Senior student during the Session. This might seem a small number, yet it means that four new cases must be received in the clinic each week. This average our school finds it somewhat difficult to maintain, so that we have felt constrained to place the requirement at one practical case for each student with proper credits for extra cases.

There is a great difference in the methods adopted for securing this clinical material and instead of placing the responsibility of furnishing these cases entirely upon the student, it should be the duty of the Orthodontia Demonstrator and of EACH demonstrator to recruit these cases from the various clinical departments, not excepting the extracting room. Many cases may be secured in this way, which, though comparatively simple ones and requiring simple appliances, serve to illustrate the management of the patient, and the time required in tooth movement.

Regarding the didactic or lecture courses, as presented by the professor of Orthodontia (confining it to the Senior Year and giving one lecture each week) I have found that the subject can be well covered by sixteen lectures and six quizes. This finishes the course before the first of April and affords opportunity for the elaborate system of reviews, now seemingly necessary in the Senior year, in preparation for the State Board Examinations. The preparation of appliances, models and projection materials is ordinarily so elaborate that it is preferred to separate the quiz entirely from the lecture hour, making it either a written or oral test about once each month, conducted by the lecturer (not the demonstrator).

The collection of plaster models which gradually accumulates is of much use if the student can be induced to examine them on the shelves, but the modern opaque projection lantern, while not perfect, promises the opportunity of projecting at one time an entire group of models representing the progress and completion of a regulating case. In other words these models are much more useful on the screen than on the shelves and more useful in groups than when projected singly.

As to the subject matter for the course and its proper sequence I make bold to say that I find nowhere better presented than in Guilford's Orthodontia, and that this forms an excellent text-book for the student. The presentation is very orderly and while we might wish it somewhat more elaborate in the examples of methods of treatment, that portion of the subject is usually sufficiently elaborated by the lecturer.

The Etiology of Irregularities of the Teeth is in somewhat of an unsettled state, but the chapters there found form a safe guide for the student's notes and study. I am more and more convinced that the student (as well as the practitioner in Orthodontia) should be made faihiliar with the VARIOUS excellent methods and types of appliances for treating cases. In this matter his technic work and clinical treatment should be as comprehensive as possible, both for the good of his patients and in order that he may not be tempted as a practitioner to array himself in the heated exploitation of a single system of Orthodontia treatment.

The nomenclature of Orthodontia is also in a transitional state, but the definitions given by Guilford supplemented by such changes and additions as may be suggested from time to time in the lecture course is a safe guide to the student for the present. The same may be said of the classification of cases. I prefer that given in Guilford because its terms are as a rule descriptively indicative of the conditions presented. The ideal scheme of nomenclature and classification is perhaps still to be evolved, or in deference to the forthcoming report of the Committee on Nomenclature, we should perhaps say, is soon to be presented. The essential thing is that a definite system of nomenclature and classification shall be early adopted by the instructors in the Orthodontia course and used by them and by the students in the description of cases.

The question of a text-book to be used in any dental class is an important one. Such a book can not be dispensed with unless the lecturer has an exceedingly orderly scheme of lectures and can furnish to the student a good synopsis of his course. Otherwise the student, depending entirely upon his notes, will be floundering in his study.

Most of the text-books on Orthodontia present but a single system of regulating teeth, which makes them less useful for class work. The same criticism, I believe, may be applied to a demonstrator or instructor in Orthodontia who teaches but a single system; at least we so apply it in our school. All text-books on the subject should be readily accessible to the class in the college library.

It is perhaps in the technical part of the course in Orthodontia that the greatest variation in requirements is observed. It has been recommended that the simpler technic pieces be made in the Freshman year. We formerly began the Orthodontia Technic in the Junior year, with the drawing of wire and tubing, making plate, solder, etc., but the course is now confined to the Senior year with the Elementary technic requirements largely eliminated and the number of technic pieces reduced to examples of the different types of regulating appliances and retainers, finished and mounted. The student's time is thus conserved and the Senior's technical ability is immediately concentrated upon complete appliances. The assignment of these technic pieces is made by the Demonstrator twice each month or oftener, with a demonstration to the class of the construction of each part. In this way impression taking, model making, plaster face casting, annealing, soldering, bending, swaging, plating of metal material and the assembling of these parts is demonstrated.

Very few tools need to be added to the Senior equipment for this work, the most important being the set of taps and dies for nut and screw construction, a wire plate and guage and some forms of special tweezers. We prescribe the construction of appliances from German silver where metal construction is used (excepting of course piano and other spring wire and plates for special methods).

With the introduction of such excellent German silver wire, tubing and plates, we have eliminated the making of that from the technic course, at the same time recommending that "ready to wear" appliances be resorted to only as an expediency in practice and not at all in college work.

Each type of band, bar, nut, screw, bit, headpiece, etc., sold by the different manufacturers should however be presented to the class and its merits described.

The material used in the construction of regulating appliances is fortunately so inexpensive that no protest is heard from the student when he is asked to supply it for technic pieces that are not returnable. For the same reason clinical cases can be undertaken by the school without fee and clinical practice is thus encouraged.

I have made no effort to give you technical details in Orthodontia, trusting that you might find something to discuss in the more general subject of the organization and management of the course.

Discussion.

Dr. A. E. Webster,
Toronto, Canada.

I have taught Orthodontia for seven or eight years, and always with the fear that it might some time in my work displace what is more essential to the student. There is so much enthusiasm in Orthodontia at this time that we must be careful not to overstep the mark. Orthodontia must take its proper place in the curriculum, and yet it must receive sufficient attention. If taught at all, Orthodontia must be taught in such a manner that the student will get something from it.

We believe that the student should not undertake this study seriously until he comes to his final year. He is not capable of understanding the principles of force as applied in the mouth until then. All those who have taught this subject know that it is the most difficult in the curriculum. I have had a fair experience in many subjects, and I find it is the most difficult, because students do not understand the principles of force as applied in the mouth. Therefore, the student should have the clinical work in the fourth year, the teaching in the third year, and the technic in the Junior year. The subject then naturally divides itself into the didactic, or the technic course, and the clinical course. The students should not be required to make a whole lot of instruments and screws and bands that can be bought ready-made better than they can make them. It is a question whether we should make nuts and taps and drills. True, the student must know how to cut a thread on the wire, and he ought to know how to tap a nut, but the less of that work he does, the better. He can get sufficient technic work for finger manipulation in other departments.

The question of soldering is an important one in the technic course. The student must know how to solder with soft and with hard solder, otherwise he will be very clumsy in making the appliances he needs. Any man who has ever gone through that technic and given lectures and had students make appliances, will be surprised how little the student understood about it. He must be right beside the patient and be required to design and make an appliance before he really understands what he is doing. I have had students make an appliance and fit it on the teeth before they really knew what they were doing. These students are not going to be great successes in orthodontia.

In the third year, the student ought to be prepared to begin his orthodontia clinic as soon as the infirmary opens, because the cases that must be carried through, must be begun early. The essayist speaks of three or four patients being received each week. The patients who come in March or April are of no use to us. The patients of value must be received in October or November, because the student must have sufficient time to carry on his work during that year. Only the simplest cases may be undertaken late in the course. In fact, you can not undertake the major case in a dental clinic at all. First, because of the lack of skill on the part of the student, and, second, because of lack of time. You can not transfer these patients to another student, even if the school is open during the summer.

As to how to use the clinic in teaching: The professor of that year ought to have the patients brought before the whole class, taking one type of case and exhibiting with it all models he may have and presenting also a study of such cases as are recorded in the literature. That keeps the student interested. He sees a case from beginning to end, not only in the classroom, but also in the infirmary. When the case is completed, it is advisable to bring it back to the lecture room and give every student an opportunity to look it over.

The essayist stated that the demonstrator should see to it that the students get patients. He also said that the demonstrator ought to go to the extracting room and root up cases for orthodontia. An institution should be so correlated that no patient for Orthodontia should come in without the department knowing something about it. Somebody ought to look after these things. No institution should be run with independent extracting department or an Orthodontia department, nor should any demonstrator be expected to rustle for patients.

It is essential to keep the models in such form that they can be used afterwards. The patient returns after two years complaining that the teeth that were straightened out have gone back again. Unless you have a complete record of that case, you are lost. If you have, you refer to your records, find the original models, and the models of the completed case, the clinical history and the general remarks all written up by the students who did the work. Then you can tell something about that patient's teeth, and you can talk about the case.

Dr. C. R. Jackson, Indianapolis, Ind.

As I did not have the privilege of reading this paper until yesterday, I am not prepared to discuss it at length. Dr. Smith said a good clinic should furnish two cases to each Senior student during the session. I agree with him, but we must admit that it fails to do so. We do not make any requirements in Orthodontia because the number of cases that come in is doubtful. This scarcity in material can be overcome in part by assigning two or more students to each case. Each Orthodontia patient coming to the operatory should be seen by as many of the Seniors as possible, especially if the case is a peculiar one, one that requires special treatment. Seeing one patient is worth a dozen models and charts.

Dr. Smith did not say much about the technic part of Orthodontia, because, he said, it had been so well covered in former years. I do not agree with him, however, when he says that he would do all the technic work in the Senior year. I think it belongs to the Junior year, so that at the beginning of the Senior year the student can make any appliances necessary with very little or no instruction.

I do not agree with Dr. Webster that the Senior student knows but little about the forces in the mouth. I teach dental physics and I try to impress on the students in the beginning of the term the forces which are exerted on the teeth. The students probably are not able to comprehend these forces at first, but we labor with them until they do.

In regard to the technic course, I think that the student when making appliances should have before him a perfect model of the appliance he is trying to make, and not, only charts and diagrams. They can not convey the same idea as does a model. The lecturer can not get too close to the student, and I believe he will know better what the student demands and be better able to instruct him if he is both lecturer and demonstrator.

Dr. Smith's method of setting apart a quiz hour each month has a great many things to commend it, but the old idea of taking fifteen minutes from each lecture period to quiz over the points taken up in previous lectures will enable us to find out whether the student is following our ideas, and if not, we can correct him at that time. If the course is well advanced, much benefit can be derived by inducing the students to discuss methods of treatment of different cases. For instance, I assign at the end of a period a certain case to several students, who must prepare to discuss it fully at the next period. I choose a case which has presented itself in the infirmary so that the students can examine the patient and study the models. If this is not possible, they can be given a description of the case accompanying models. This method induces thought, engenders self-reliance and excites friendly rivalry. Allow the student to study the case and outline the treatment; then correct him if he is in error and advise him as to better methods.

I fully agree with Dr. Smith in regard to the methods of teaching. We do not want to teach a system. It is principles that we must teach. A proper teaching of the subject should embrace all systems and all methods. We know that the personal equation enters into operations in the mouth as well as elsewhere. Every teacher and every practitioner has a system of his own.

The ideal text-book, that is, a text-book for students and practitioner, has not been printed. I am often asked by men practicing in smaller towns what text-book I would recommend them to follow. That is a difficult question to answer. Dr. Guilford has given us an excellent book, and he was generous enough to include not only his own methods, but the principles of several other methods. I think his last edition is better than the previous ones, and by elaborating much of his material he can give us a text-book which will be close to the ideal.

Dr. W. E. Grant, Louisville, Ky. The essayist has confined himself to many statements of facts, so that he does not give much opportunity to disagree with him. He has taken up the consideration of teaching Orthodontia as embraced in our entire College course, which I think is wise at this time.

I do not agree with the statement that Orthodontia is essentially a Senior study. It has been shown that to produce interest requires continued application on the part of the student and much urging on the part of the teacher.

We have given considerable time and thought to this subject and examined the methods of several schools, as well as experimented in the technic departments, requiring Orthodontia technic from the three classes. Our conclusions are that two or three simple appliances required of each man in the Freshman class after all prosthetic and operative technic has been finished is a very good practice; that above all the Junior student be required to make at least five appliances in his technic work, he should have didactic instruction and in the last half of the Junior year, some simple clinical experience. Thus, by the time the student has reached the Senior year, if he is in earnest, you have impressed the subject upon him so that he takes hold of it, both didactically and clinically and derives good from it. We find that many students become interested in the subject in a practical way between the Junior and Senior courses. Their instructors surn these cases over to them. They are also brought to realize the opportunity Orthodontia offers as a practice builder and the influence their results will have on their future in the community.

The division of the work between the professor and his assistant as outlined, should produce very satisfactory results. More stress might be laid upon the importance of securing clinical material as is pointed out. Cases requiring simple appliances and very little attention will prove beneficial to the little patient and very instructive to the student.

In quizzing and in examinations, written or oral, I find it a good plan to ask the student to carry through (for illustration) a given case of irregularity. Some stress is laid upon the use of the projection lantern in teaching this subject. We have a very fine instrument and nearly all of our teachers have used it at different times. Personally I have decided that a dark room is a very bad place in which to give instruction. It is difficult to impress the class as a body with the importance of the subject you are teaching by this means. It resembles too much a form of amusement, and many of the teachers have difficulty in keeping order. Then we all appreciate how important it is to look into the faces of those we are trying to instruct and to put enthusiasm in your teaching, letting each of them feel that that particular hour is intended for him. I think more of the use of large photographs, drawing on cardboard and on the blackboard than an attempt at instruction in the dark room.

I am glad to add my testimony to that of the essayist in an expression of appreciation of Guilford's Orthodontia. I find it in much better shape for a text-book than any other that is presented to us to-day, although we have a number of other excellent books and many able articles, which can be used for reference purposes.

In the etiology of irregularities of the teeth there is an opportunity for much thought and investigation, which should prove interesting to the teacher, and his findings would be a great assistance in advancing this particular part of the work.

Dr. N. Hoff,
Ann Arbor, Mich.

I wish to protest against the statement that each student should have a patient in Orthodontia. It is not possible to treat a large number of cases successfully in a college clinic. Just stop and think a minute how many cases are treated each year by men who are making a specialty of this work. Not more than twenty-five or thirty, and these men are giving all their time to this work. Is it possible or practicable to turn over to our students a lot of sensitive children who must be taken care of? If you have fifty or one hundred students, is it practicable to to take on that many cases and expect any professor to take charge of them and see that they are treated successfully? It is perfectly absurd. It can not be done. The first year that I taught Orthodontia in our school I took on some thirty-odd cases, and our professor of Orthodontia criticized me severely because I had burdened him with so much work. We did not get good results. Now, we take only such cases as will illustrate the system or method of doing this work that our professor teaches. We will not take more than fifteen or eighteen cases a year. The patients are brought into the clinic twice a week, and the entire class sees each patient. The treatment is outlined, the student who has charge of that particular case is asked to tell what he has done, and why he has done it. If anything has gone wrong, it is explained as each patient is brought before the class to show the results of the treatment. We take on a few simple cases in the later part of the session, but do not take on any serious case after the Christmas holidays. The student gets the benefit of the whole treatment by this method and I believe we are much more successful teaching by this method.

As to the methods of teaching principles and practice. Practice is the thing we are aiming at, but we must teach both theory and practice, without spending all of our time teaching either exclusively. We must emphasize the fundamental principles rather than a method of practice. Good methods of practice must be built on principles, and the principles which underlie any one man's practice underlie the practice of all men. A man teaching the subject will teach principles and refer to different methods, if necessary; at least he should do this in order to make an intelligent presentation to the student.

Dr. B. E. Lischer, St. Louis, Mo.

I agree with the essayist as to his division of the subject into the didactic, clinical and technical parts. I don't agree with him in making it a Senior study exclusively for reasons that will follow. I wish to congratulate Dr. Smith for introducing the subject of orthodontia at the present time, for no other study, in the entire curriculum is quite so chaotic, quite so in need of a thorough over-hauling.

It is perhaps not incorrect to state that the literature of to-day on the subject of orthodontia, presents certain tendencies. No one, who has watched the signs of the times, can have failed to perceive that a controversy has arisen. This new situation has stirred up two antagonistic camps, two so-called "schools," the OLD and the NEW. The cause of this enstrangement is said to be MOTIF. Thus the new school makes the charge that the old school is not prompted by a sufficiently high idealism, that it exhibits a very evident lack of system, and that many of its methods are obsolete.

Now it is a noteworthy fact that the technical phases of the art were constantly kept in the foreground during the earlier periods of its development. Of course, the technique is still regarded as an important division, but the assertion is frequently made that the day of the "home-made" appliances is rapidly approaching its twilight, that the dawn of another era is upon us, that a wider view and an appreciation of greater possibilities are directing our attention and energy to other problems.

In Vol. XX, of the Dental Cosmos, appeared the following prophecy from the pen of Dr. J. N. Farrar: "It has for some time been evident to me (though by most people thought to be impracticable) that the time will come when the regulating process and the necessary apparatus will be so systematized and simplified that the latter will actually be kept in stock, in parts and in wholes, at dental depots in readiness for the profession at large, so that it may be ordered by catalogue numbers to suit the needs of the case; so that by a few moments' work at the blow-pipe in the laboratory the dentist may be able, by uniting the parts, to produce any apparatus, of any size desired, at minimum cost of time and money."

That prophecy has been partially fulfilled; orthodontia has passed through certain elementary stages and is now reaching as high a degree of development as most other departments of dentistry. Time was when the operator made his pluggers, the prosthodontist his plate-gold and solders; similarly was it considered an orthodontist's duty to invent and construct his apparatus for the case in hand. But after years of ceaseless toil, "of immeasureable devotion of energy and time and genius" to a most worthy art, certain facts of our experience have finally been systematized. It is universally conceded that appliances are but the means to an end—the remedies, as it were—with which the operator should so familiarize himself as to MASTER THEIR USE AND MANNER OF APPLICATION. Machine-made appliances are not only more economical, but far more accurate and efficient.

During the last decade so many "systems" have been offered us, along the lines of "ready-to-wear" appliances, that the difficulty with most teachers has been the elimination of all that is unnecessary or a mere duplication. It is an extremely unfortunate condition, one that could and should have been avoided, but at this late hour we are confronted with a situation that is a veritable "mess," a pot pouri, and now the question is, how shall we eliminate the bad and retain the good? And there is much that is good in these systems.

With your permission, I desire to outline a course of teaching for the dental student, as taught at present under my direction, that is fairly comprehensive and based fundamentally upon these newer methods of treatment. But in order that I may not be misunderstood, I wish to state here that the first requirement of a teacher of orthodontia is, THAT HE MUST NOT BE A FADDIST. Therefore, if I include a course in the technique it is not confined to any one system.

First, as to the lectures to be delivered by the head of the department. Instruction should begin in the Junior or middle year, with a study of the process of dentition—the mechanism of eruption—including a broad but brief review of the forms and functions of the teeth from the standpoint of comparative dental anatomy.

Special attention is then given to the normal alignment of the teeth of man, including a comparative study of ethnic types, the so-called ethnological groups. Opportunity is here offered to the teacher to dwell upon philosophical causeries, regarding the recurrent forms in nature, the "phenomena of Plato," and as to whether they "have a method in their comings and goings, and is this method in turn definable," as some writers would claim. In other words, the imperious hypothesis of "ideal occlusion" must here be fully discussed. Is it the basis of the science? The recent utterances of Dr. Angle and his followers, the best accredited exponents of this hypothesis, indicate that they regard the line "of occlusion" as a "mark of design." Can a typical occlusion be so regarded? Next comes a discussion of the so-called "Line of Harmony," the doctrine that the features of the human face are largely dependant upon "ideal occlusion."Is it true that the profile is always of the same outline when the ideal obtains, or is this another aesthetic orgy? If this problem is correctly presented the student will realize that the much-heralded "eternal types are the instrument of aesthetic life, not its foundation."

Following this comes a general outline of anomolies, that is, those that form a portion of the subject-matter of the science of orthodontia. The anomolies of the temporary teeth, a rich literature of which has accumulated in the journals and texts devoted to pediatrics, especially on the continent of Europe, ought also to be dwelt upon. Next comes a study of causation, which opens a large field to the lecturer, owing to the theories of inheritance and certain allied biological considerations and Darwinian principles. All of the various methods af classification or diagnosis are then considered and the necessity for a suitable nomenclature is also discussed, including a general grouping of the various types that all writers recognize.

A careful study of the alveolus and pericementum from the orthodontist's standpoint, including the tissue changes incident to tooth movement, are then taken up. This course will require about one lecture per week throughout the entire year.

Now all teachers realize that, in addition to the teaching done in the lecture room and the practical operations performed in the infirmary during the Senior year, there should be offered a laboratory course in the technique, enabling the student to master the use of instruments and materials, and the DETAILS OF RECOGNIZED METHODS OF TREATMENT, METHODS THAT GIVE PROMISE OF UNIVERSAL ACCEPTANCE.

This course should be divided into four parts, as follows:

1.—The construction of plaster models.

2.—The technique of soldering as related to orthodontia and the making of plain bands and all the various attachments, at least 10 in number.

3.—The combination of several standard forms of appliances, at least 10 in number.

4.—The construction of retention appliances, at least 10 in number. This gives us an exercise for each week, throughout the entire year, under the supervision of the instructor in technology. The student ought to systematically perform all of these exercises before attempting the treatment of cases.

In the Senior year the subject is so arranged as to follow, as nearly as possible, the order of operations in the mouth. This, necessarily, includes some remarks on preparing the mouth for treatment; the keeping of records as the treatment of cases progresses; the office management of patients; the care of the mouth during treatment; the history of the methods of treatment; a comprehensive study of recent methods, particularly all such as give promise of wide and universal acceptance; the relation of such cognate studies as rhinology; facial deformities resulting from irregularities and mal-relation of the arches; the treatment of cases in detail; the principles of retention practically applied; the literature of orthodontia; its relation to general practice; orthodontia as a specialty; the ethics of specialization; about fees for services to be rendered; on scientific contributions to the literature, including a study and criticism of current articles; the building up of a practice, etc. This will require at least one lecture a week and if illustrated with slides and designed as a continuation of the Junior course it will result in a fairly comprehensive presentation of the subject.

Last, but not least, comes the clinic. This is so important a department and one that has been so neglected, that an entire paper might easily be devoted to it. It would seem that if any thing like an ideal arrangement obtained, the clinical material ought to be largely utilized for scientific purposes. This is easily the most difficult problem for the teacher, owing to various reasons, chief among which is the culture of the average patient. Only a broad, sympathetic and self-sacrificing operator can hope to utilize this field to the best advantage; and the methods of keeping records, of the equipment required, and the constant encouragement that must be instilled into the minds of these little patients and their parents, make it a most difficult task. The methods of treatment employed ought not differ from those sanctioned by the head of the department in his lecture course and for which the junior technic course is but a proper preparation. It does seem like a reasonable hope that, if this is done correctly and systematically, that the graduate of the future may easily acquire sufficient skill to be able to treat many cases that fall under his care. It ought require no argument to convince even the most skeptical, that orthodontia ought to be taught to every student, for if he locates in one of the smaller cities, where there are countless thousands of poor unfortunates upon whom the specialist never smiles, he will be able to render a noble service to suffering humanity, to qualify himself in an art for man's sake.

In conclusion, I wish to say that it is my firm conviction that the real systematist in orthodontia has not yet arrived, for he will have no "system" in the sense that we understand that term to-day. What we need, and need badly, is a Cattell; a man who will build up a thorough technic course in this department along the lines of the newer methods, but who will eliminate all personal systems as such.

Dr. S. H. Guilford,
Philadelphia, Pa.

I was exceedingly well pleased with Dr. Lischer's discussion. He is a positive conservative. That is what we want. We must recognize that good work has been done in the past, and that it is still being done. We are all ready to believe that what we have taught in the past is the best, but we must be ready to take on the new as well.

It has been my practice to teach orthodontia exclusively in the Junior and Senior years, never beginning in the Freshman year, because the Freshemn have so much other technic work to do. We cannot always supply practical cases to each Senior student, but we generally assign one case to two or three students. We have the students examine the case and give their opinion as to what treatment ought to be instituted. After a decision has been reached, one student makes the appliances, the others assist, and so on, so that two or three men carry the case along to its termination. I believe that this study is one that the Freshman student should not have much to do with, beyond the technic part of the work. The practical part can be taught better after the student has reached his Junior year. But we all agree that we need everything that has been outlined in the paper. We want to cover the ground as fully as possible. I can understand why most schools cannot cover the ground Dr. Lischer outlined, because it is so comprehensive. Much of the dental anatomy students get from other chairs, but this is a wonderfully good outline, and we can all adopt it by modifying it a little to suit ourselves. It is the best presentation of the subject that I have ever listened to, and I want to compliment the Doctor on his paper.

Dr. H. T. Smith, Cincinnati, O. My paper was a general one, and the two or three points I made related to the obtaining of clinical material, the utilization of that material, the question of text-books, and the proper place in the curriculum for this orthodontia course. I called attention to the fact that the over enthusiastic technic teacher may crowd out some of the technic work of the other departments, and I warned against that. I suggested that technic in orthodontia be confined to the Senior year. Dr. Guilford's idea of putting some of this technic in the Junior year is a good one, and we have done that up to last year. Yet I believe that the technic in the other departments is growing so fast with the number of studies constantly being added to the curriculum, that we should see that the teacher of orthodontia does not consume too much of the student's time.

The Senior student having acquired general training in technic in the Junior year, he can the more easily concentrate on the making of orthodontia appliances in the Senior year.

It was said that there should be one practical orthodontia case for each student. That is not possible in most clinics. We are not not always able to do it in ours. However, should each student have a practical case, even if it is quite a simple one, he will learn the management of the patient and the time required in this work, to much greater advantage. We do not hesitate to take on practical cases whenever we can get them, even though they present late in the session. The Senior student carries them along as far as he can, and the clinical demonstrators take care of them during the summer.

In regard to orthodontia appliances I still believe that most of those used, especially in a dental school, should be made by the students. Ready-to-wear stock appliances should be demonstrated and the student should be made familiar with them, but they need not be used in the clinic.

The question of records I did not touch on. Of course it is important, and each school will have a system of its own.

Coll D D S of N.Y.

PROCEEDINGS

OF THE

Fifteenth Annual Meeting

OF THE

Institute of Dental Pedagogics

HELD AT

New Orleans, Louisiana

December Thirty-first, Nineteen Hundred and Seven
and January First and Second, Nineteen Hundred and Eight

Reprinted from THE DENTAL ERA, by John T. Nolde Dental Mfg. Co.,
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Fifteenth Annual Meeting
OF THE
Institute of Dental Pedagogics

MINUTES.

The fifteenth annual meeting of the Institute of Dental Pedagogics convened in the St. Charles Hotel, New Orleans, La., Tuesday morning, December 31st, 1907.

President Kennerly called the meeting to order at 10.15.

Reverend Father Blenk, Archbishop of Louisiana, pronounced the Invocation.

Mr. John F. C. Waldo, New Orleans, La. (representing the Mayor of the City of New Orleans), welcomed the Institute to the city (see page 14). This was responded to by Dr. T. W. Brophy, of Chicago (see page 15), and Dr. A. G. Friedrichs, of New Orleans (see page 17).

A report of the Executive Board was presented by Dr. J. Q. Byram (see page 10).

The Secretary-Treasurer then presented the following report:

REPORT OF SECRETARY-TREASURER.

The proceedings of the last annual meeting were received April 1st, having been prepared by Dr. W. E. Willmott. Said proceedings were offered to the publishers of the Dental Era, of St. Louis, who, after publishing several addresses in the August and September numbers of that magazine, have printed and bound three hundred copies for distribution. A copy was mailed to every teacher who registered at our meetings during the last two years. The Secretary's books showed a delinquent list of five schools to whom statements were duly mailed at stated intervals.

Number of Colleges, members December 27, 1906......	36
" " reinstated on application........	1
Present membership...........................	37

FINANCIAL STATEMENT

Cash from 1906............................	$117.15
Arrears of fees paid	30.00
Fees paid for 1907	340.00
Fees paid for 1908	10.00
Bank Interest............................	2.16
	$499.31
Expenditures as per vouchers................	$265.82
Cash on hand Dec. 31st, 1907.................	233.49
	$499.31

St. Louis, Mo., Dec. 30th, 1907.

B. E. LISCHER,
Secy-Treas.

Approved:
E. HILLYER,
D. M. GALLIE,
J. Q. BYRAM,
Executive Board.

New Orleans, La., Dec. 31, 1907.

On motion, the report was referred to the Executive Board for auditing, who accepted same as above, and recommended that the minutes as published in the proceedings be accepted.

The President called the Vice-President to the chair and presented his annual address, (see page 20.) This was discussed by Drs. Friedrichs, Friesell, Brophy and closed by Dr. Kennerly The President then resumed the chair.

The local committee, through Dr. Archinard, invited the members of the Institute to a banquet at Antoine's, Tuesday evening.

Dr. Welsch, on behalf of the profession of New Orleans, invited the members to a banquet at L. Union Francaise, Wednesday evening.

Dr. Brophy then read the report of the Commission on Nomenclature, which was accepted as read (see page 151).

The Lincoln Dental College was recommended for membership, and on motion accepted.

Adjourned to meet at two o'clock.

TUESDAY AFTERNOON.

Meeting called to order by the President at two o'clock.

The report of the Commission on Nomenclature was continued by Dr. Brophy, who then read letters from Drs. Guilford and Wilson (see page 165).

This was discussed by Drs. Patterson and H. E. Friesell.

Dr. C. S. Case then read his paper, entitled "Recitation Teaching in Orthodontia," (see page 31).

This was discussed by Drs. Lischer, Jackson, Weiss, Byram, Webster, Tileston and Hillyer, Dr. Case closing the discussion.

The meeting then adjourned until 9.30 Wednesday morning.

WEDNESDAY MORNING.

President called the meeting to order at ten o'clock.

Minutes of the two sessions of Tuesday were read by the Secretary, and approved by the Institute.

Dr. Webster read his paper on "The Teaching of Subjects not Previously Presented Before the Institute" (see page 50).

Discussed by Drs. Cattell, Strout, H. T. Smith, Semans, Walls, Byram, Fickes, Hillyer, Gethro, Gallie, H. E. Friesell and Brophy.

Dr. Webster then closed the discussion, after which the meeting adjourned to 2.00 p. m.

WEDNESDAY AFTERNOON.

Meeting called to order by the Vice-President at 2.10.

Dr. Tileston read a paper entitled "Teaching Operative Dentistry and Dental Pathology" (see page 79).

Paper was discused by Drs. Gallie, Waugh, Hall, Webster, Gethro, Catell, Shattuck, Semans and Davis, Dr. Tileston closing the discussion.

Dr. Bartlett presented his paper on "Teaching Prosthetic Dentistry" see page 104).

Paper was discussed by Drs. Sanger, Hillyer, McGruder, Byram, Brophy, Shattuck and Snow, Dr. Bartlett closing the discussion.

The meeting then adjourned to Thursday morning.

Thursday Morning.

Meeting called to order by the President at 10.15

Minutes of the two meetings of Wednesday were read and approved.

A paper on "The Teaching of Dental Ceramics" was read by Dr. Fickes (see page 116).

Discussed by Drs. Randall, Buell, Lyons, Patterson and Byram, Dr. Fickes closing the discussion .

Dr. Carl D. Lucas read a paper on "The Didactic Teaching of Dental Anatomy, Histology and Embryology (see page 133).

Discussed by Drs. Bebb, Noyes, Babcock and Catell, Dr. Lucas closing the discussion.

President Kennerly appointed Drs. Hillyer, Tileston and Semans as a committee to draft resolutions on the deaths of Drs. Hart and Littig, and to present same to their respective families.

Master of Exhibits, F. C. Friesell then read his report and on motion was accepted.

A communication from Dr. J. B. Willmott was read by the secretary in which he asked for a discharge of the Commission on Text Books.

The request was granted and the following commission appointed instead.

Dr. H. E. Friesell to serve three years.
Dr. H. M. Semans to serve two years.
Dr. A. E. Webster to serve one year.

Christmas greetings from Dr. Weeks were read by the Secretary and on motion was asked to reply in behalf of the Institute.

Election of Officers for the ensuing year resulted as follows:

President............W. E. Willmott, Toronto, Ont.
Vice-President.......Ellison Hillyer, Brooklyn, N. Y.
Secretary-Treasurer.....B. E. Lischer, St. Louis, Mo.

EXECUTIVE BOARD.

J Q. Byran........................Indianapolis, Ind.
D. M. Gallie.....................Chicago ,Ill.
D. M. Friesell...................Pittsburg, Pa.

Moved by Dr. Byram, seconded by Dr. Willmott that a unanimous vote of thanks of the Institute be extended to the New Orleans College of Dentistry, to the profession of New Orleans, and to the ladies of New Orleans, for their hospitality.

Moved by Dr. Gallie and seconded by Dr. Gethro, that the Secretary thank the management of the St. Charles Hotel for their courteous and liberal treatment.

The minutes of the session were read and approved.

Adjourned.

At a meeting of the Executive Board, held immediately after adjournment, it was decided to hold the next annual meeting at St. Louis, Mo., December 30 and 31, 1908 and January 1, 1909.

Dr. F. C. Friesell was re-appointed Master of Exhibits, and Dr. W. F. Lawrenz Master of New Teaching Facilities.

Drs. C. D. Lukens, J. D. White and O. J. Fruth, Local Committee of Arrangements.

REPORT OF MASTER OF EXHIBITS.

Mr. President and Members of the Institute of Dental Pedagogics:

As Master of Exhibits, I have the pleasure to report the following, shown at this session:

New York College of Dentistry.—Freshmen students' work in operative and prosthetic techics. Teaching models in operative dentistry. Charts for oral surgery clinics.

Chicago College of Dental Surgery.—Junior requirements in gold inlays. Freshmen rosters for prosthetic technics.

Indiana Dental College.—Freshmen student's work in operative, prosthetic and instrument technics; and also in dental anatomy.

Junior student's work in orthodontia, crown and bridge porcelain technics.

TEACHING METHODS.—Models showing cavity preparation for porcelain inlays. Charts illustrating the necessity for having the plane of occlusion in proper relation to the glenoid fossa.

NORTH WESTERN UNIVERSITY DENTAL SCHOOL.—Freshmen student's work: Teeth carved reproducing natural forms according to Mm. scale. Cavities filled with various filling materials. Instruments.

TEACHING Methods:—Enlarged instruments (Black's). Enlarged Mm. scale.

ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO.—Infirmary cards for use in keeping record of all the work done by each student during the entire period of clinical practice.

UNIVERSITY OF MICHIGAN.—Infirmary records for tabulating the clinical work of each student during his period of infirmary practice.

LINCOLN DENTAL COLLEGE.—Freshmen, Junior and Senior student's work in operative, prosthetic, instrument and dental anatomy, technics. Also work showing laboratory requirements in general anatomy, physiology, chemistry, histology and bacteriology, and charts showing the requirements in each subject outlining the work for each semester of the college course.

WESTERN UNIVERSITY OF PENNSYLVANIA, DENTAL DEPARTMENT.—Freshmen, Junior and Senior student's work in operative, prosthetic, porcelain inlay and porcelain crown and bridge technics.

Rosters giving list of requirements in each year.

TEACHING METHODS.—Enlarged plaster models, charts and colored cards showing the color scheme for porcelain inlays.

OHIO COLLEGE OF DENTAL SURGERY.—An aluminum head for purpose of demonstrating.

VANDERBILT UNIVERSITY.—Student's work in Freshmen, Junior and Senior operative and prosthetic technics, except in gold and porcelain. Promises something rich for next year.

The letters sent to the various Deans asking for exhibits, clearly stated that it was our desire to have shown the progressive steps in the various classes of technic and laboratory requirements, by presenting the actual work done by one student during the Freshmen, Junior and Senior years.

We are thankful to those colleges that have helped to make this part of our meeting a success, and special credit should be given the Lincoln Dental College, whose exhibit was completely in accord with our request. It is to be hoped that every one will take away with him some new ideas as the result of his obrsevation in the Exhibit Room.

We deplore the indifference displayed by so many of the colleges but an evidence of renewed interest in this department of the Institute was manifested during the discussion of several of our papers at this meeting.

In examining the proceedings of this body covering the last five years, it will be found that more colleges had exhibits in the last two years than in any of the preceding three years, for in 1903 there were 9; in 1904, 6; 1905, 6; 1906, 10; 1907, 10, and this is encouraging, although it seems to me that a great improvement could be made, if you would only take the trouble.

This year letters were sent inviting exhibits from 42 colleges, and only 21 replies were received acknowledging the communication, even though a second appeal was made; however, if my successor will be persistent and start early in the fall to make his appeals, there is no doubt but that he will feel satisfied with the results.

I know you have listened to a great many good papers and discussions, and are anxious to get through with the routine business, but my fidelity in your service might be questioned if I neglected to offer some suggestions that seem appropos, as the result of two year's experience as Master of Exhibits, and even though you can or will not hear me now, I ask that you read the report when it reaches you in the proceedings.

To the colleges I would suggest that their exhibits be arranged with two objects in view—one, the methods of teaching and the other, the results as shown by the student's actual work, and bring with you cards bearing the inscription, "Teaching Methods" and "Student's Work," so that when your exhibit is in positon, the proper placing of these cards will not necessitate the presence of any one there to explain.

To the Committee on Arrangements I suggest the choice of an exhibit room located as close as possible to the Assembly Room;

that trestles be used on which loose boards may be placed and the top of the table be inclined at such an angle as to enable a full view at some distance; that a list of members of the I. D. P. be furnished the Maser of Exhibits before September 1st, and finally, that one definite portion of some day be given to the examination and demonstration of exhibits.

I am sorry that my efforts did not result better, and still I am certain that it was not due to any lack of faithfulness in me, and I bespeak for my successor your hearty co-operation.

Respectfully submitted,

H. E. Friesell,
Master of Exhibits.

REPORT OF EXECUTIVE BOARD.

To the Institute of Dental Pedagogics:

Your Executive Board begs to submit the following report.

Chicago, Ill., December 29, 1906, Drs. Gallie and Byram met with Ex-President Stubblefield, President Kennerly, Vice-President Willmott and Secretary Lischer immediately after adjournment of the last session of the Institute. It was decided to hold the next meeting in New Orleans, La., December 31, 1907 to January 1 and 2, 1908. Dr. F. C. Friesell, of Pittsburg, was appointed Master of Exhibits. Dr. N. T. Yager, Louisville Ky., was appointed Master of New Teaching Facilities, and Dr. L. D. Archinard, H. P. McGruder and V. K. Irion were appointed a local committe on arrangements.

The following essayists were selected, and complied with our request to present papers. Drs. C. S. Case, Chicago, A. E. Webster, Toronto; Walter Bartlett, St. Louis; Harry B. Tileston, Louisville W. L. Fickes, Pittsburg; and C. D. Lucas, Indianapolis.

About June 1, 1907, the essayists were reminded of their promise, and all responded nobly to our call. About October 1st, they were requested to complete their essays by December 1st, in order that the discussers might have ample time to prepare written discussions. All essays were mailed to the discussers on or before December 17th. The chairman of the commission on Nomenclature was notified that the report of his committee would be an important feature. Twenty-five teachers consented to discuss the essays, and the report of the commission on Nomenclature, and they were requested to prepare written discussions.

On October 1st, the Deans of the colleges, holding membership in this Institute were reminded of the meeting and requested to use their influence to have their schools represented with large delegations. They were also requested to assist the Master of Exhibits and the Master of New Teaching Facilities. They were again officially reminded of the meeting about November 20th. Twelve Deans replied to these letters.

Four hundred preliminary programs and announcements were mailed on November 15th. We divided the United States into four sections for advertising the meeting. Dr. Gallie taking the north from Toronto, Ont., to Portland, Ore. Dr. Hillyer, the states east of the Alleghanies. Dr. Lischer, the states west of the Mississippi, south of the 40th parallel. Dr. Byram, the central and south central states. The meeting has been well advertised. Copies of the programmes were mailed on December 15th.

The Executive Board acknowledges its appreciation of the services rendered by the local committee, and wishes to thank those who kindly consented to take part on the programme.

Respectfully submitted,

Ellison L. Hillyer,
Donald M. Gallie,
J. Q. Byram.

REPORT OF COMMITTEE ON NOMENCLATURE.

To the Institute of Dental Pedagogics :

In presenting the following annual report, your commission desires to mention that the work of preparing the terms and definitions has been almost wholly that of Professor C. M. Wright, of Cincinnati, who kindly undertook the task at our request.

Both he and we recognize that the list is not complete, but this is due to the fact that the long list of terms met with in writings upon Operative Dentistry include so many that are more distinctly allied to other dental branches that it seemed best to leave them to be taken up when those branches are reached in our future work. As Orthodontia is still in a somewhat transitional state your commission is of the opinion that it should not be taken up for the present, and would suggest for the coming year the consideration of Pathology, Bacteriology and Oral Surgery.

We would further recommend that the two reports thus far presented on Prosthetic and Operative Dentistry be printed in pamphlet form as soon as possible, and then sent to college teachers and dental journals throughout the country (and possibly Europe), for criticism and suggestions.

This would serve to make our work on the revision of Nomenclature more correct, and possibly more comprehensive when finally completed.

To this end we hope that the Institute will feel able to vote the necessary funds.

We submit herewith a statement of expense thus far incurred.

S. H. Guilford,
J. B. Willmott,
Truman W. Brophy,
Commission.

APPENDIX A.

List of membership colleges with reprentatives present:

Washington University, St. Louis, Mo.—J. H. Kennerly, W. M. Bartlett, B. E. Lischer,

New Orleans College of Dentistry.—A. G. Friedericks, J. Archinard, L. D. Archinard, Paul D. Verges, St. Clair Duke, H. P. McGruder, A. H. Victor, E. D. Martin, E. D. Friederichs, A. L. Denasse, J. C. Grinner.

Royal College of Dental Surgeons, Toronto, Can.—W. E. Willmott, A. E. Webster.

New York College of Dentistry.—Ellison Hillyer,

Indiana Dental College, Indianapolis, Ind.—J. Q. Byram, C. D. Lucas.

University of Illinois, Chicago, Ill.—D. M. Gallie.

Chicago College of Dental Surgery.—T. W. Brophy, C. S. Case.

College of Dental and Oral Surgery, New York, N. Y.—R. W. Sanger.

Pittsburg Dental College.—W. L. Fickes.

Ohio Medical College, Department of Dentistry.—H. M. Semans, R. W. Deyo, K. C. Brashear.

Detroit College of Medicine, Department of Dental Surgery.—G. S. Shattuck.

St. Louis Dental College,—M. C. Marshall, D. E. Morrow.

Western University of Pennsylvania, Pittsburg, Pa.—H. E. Friesell, F. C. Friesell.

Baltimore College of Dental Surgery.—W. G. Foster.

Lincoln Dental College.—Clyde Davis.

Kansas City Dental College.—J. D. Patterson.

University of Minnesota, St. Paul, Minn.—J. M. Walls.

Northwestern University, Chicago, Ill.—F. W. Gethro.

University of Michican, Ann Arbor, Mich.—C. J. Lyons.

Vanderbilt University, Nashville, Tenn.—D. M Catell.

Louisville College of Dentistry.—H. B. Tileston.

University of Buffalo.—Geo. B. Snow.

APPENDIX B.

Membership Colleges not represented: University of California; University of Southern California; University of Iowa; University of Pennsylvania; Philadelphia Dental College; Pennsylvania College of Dental Surgery; Cincinnati College of Dental Surgery; Milwaukee Medical College, Howard University; Colorado College of Dental Surgery; Tufts College, Dental School; Wisconsin College of Physicians and Surgeons; Georgetown University; Dental Department, Medico-Chi of Philadelphia.

ADDRESS OF WELCOME.

BY JOHN F. C. WALDO, NEW ORLEANS, LA.
(Representing the Mayor of New Orleans.)

Ladies and Gentlemen:

His Honor, and our good friend, the mayor of the city, is unavoidably detained on business this morning, and has asked me to come here in his behalf and say a few words by way of welcome to you. It is unfortunate for me, and perhaps for you, that I did not exectly know what sort of a body I was to address, but when I came in at that door I saw that this was the meeting of the Institute of Dental Pedagogics; and translating that from Greek into a mixture of Latin and Saxon, I suppose that you are a body of dental teachers.

I say it is unfortunate for me and for you, because I am somewhat in the fix of the boys in the Sunday school class when the teacher said: "Jimmy, who swallowed Jonah?" Says Jimmy, "I do not know." She then turned to Pete and said: "Pete, who swallowed Jonah?" "I give it up," said Pete. Turning to Andrew, she said: "Perhaps you can tell us who swallowed Jonah?" "You can search me" said Andrew. Remembering that she had a new boy in the class, she turned to him and said "Perhaps Johnnie can tell us," to which he replied: "I bite; what's the answer?" So you see that if what I say does not always hit the mark, do not attribute it so much to good will as to pure ignorance. However I am like the man in the old story. He threw a stone at his dog, missed the dog, and hit his cruel stepmother. Says he, "This is not exactly what I meant, but the stone is not entirely lost."

I take it that you are meeting here in a convention, and that you have come together for a purpose; for the purpose of mental improvement, as well as for spending somewhat of a jolly time in this delightful and hospitable city of New Orleans; that you came here for the purpose of advancing your profession of dentistry; that you want to be, and to keep up-to-date. It is a great thing to be progressive and up-to-date; it is not shallow to conform or believe in the saying that "there is nothing that succeeds like succes." Success is the result of practical demonstration of mevements and usefulness in this life, and one of the signs that you are successful is that you are up-to-to-date, and people take notice of this, too, which is evidenced by the following story: A coutrnyman came into a dentist's office one day, and said: "I want a tooth pulled." The dentist looked into his mouth, made an examination, and said: "Why, sir, that is a very bad tooth; a terrible tooth; I am afraid I will have to give you gas, whereupon the countryman replied: "Why, sir, do you take me for a back number; I do not want gas, I want electric lights!"

There are some people who think that a man should conform most strictly and rigidly to the one thing that makes up his trade, his business or his calling. These are the sorts of men that sometimes make money, and they do poor dentistry work; and they hang out their shingles, saying that they are from Paris, when in fact they are from Hogsville. When they die, people ask "how much did they leave?" They have left everything; they have left their moneys, gold and silver, clothes, jewelry and everything. But it is the master that can plan and build and construct, and make a useful and honorable life for himself and those about him; he is the man that not only tends to his calling in the strictest sense, but knows something of chemistry, anatomy, physiology, bacteriology, pathology and surgery; he knows something of mechanics, arts, etc., attends conventions, and takes note of the progress in his profession, and in other lines; he makes for himself friends, attends social functions and moves among the people. And when he dies it is not merely a question of what he left, but he takes something with him; he takes with him a disciplined intellect, a strong and courageous heart, and the good love, affection and esteem of his friends, neighbors and acquaintances among whom he has lived and moved.

My friends, you have come to a hospitable city, not only for improvement and knowledge, but I trust for a good time. I hope you will move about among us, and take note of the signs and indications of our progress, and as a representative of the city of New Orleans, I would like to have you go over the city, not only to look at our beautiful parks, residences, etc., but to look at the sewerage and water plant of the whole city, for the whloe city has been for some five, six or seven years torn up in preparation for the new system of drainage in order that we may be up-to-date with other cities. I would like to have you go and look at our municipal repair plant, where we do our own work in repairing and constructing streets; would like to have you go and look at the remarkable structure now going up on Royal street. It will be one of the finest buildings in this country; like to have you go over the city and look at the points of historic interest; like to have you look at the monuments we have in New Orleans, and note the Margaret monument, the first monument ever erected to a woman. She was a woman of great authority and was especially devoted to the care of the orphans. In Lafayette Square you will note the statue of Henry Clay; another one of Benjamin Franklin; and another one of John McDonough, the philanthropist who appropriated a million dollars to the city of Baltimore, and a million dollars to the public schools in the city of New Orleans. Down in Jackson Square you will see the magnificent statue of Andrew Jackson, which is duplicated in the city of Washington. Out at the cemeteries you will see various other tombs and monuments, and as you go through these famous cemeteries in New Orleans note not only the monuments erected to the dead, but the tombs—and there are hundred of these tombs—that are monuments, not merely because they represent the lavishment of large sums of money, but from the standpoint of art and beauty they are purely monuments.

I hope that you will mingle with the members of the dental profession while in the city. You will find them to be gentlemen, and, like the other people in the city, a very hospitable set; and we want you to take away with you something, not only of good feeling and all that sort of thing, but we want you to take away to other parts of the country some of the evidences that the people of New Orleans are prosperous. Of course, we have our little financial flurries, but I do not think we have been as bad as elsewhere.

I hope you will have a good time while here.

In conclusion I want to give a part of one of the most beautiful poems I ever read. It was written by a Dutchman from Holland upon the first teeth of his infant son. Here are the last two lines as I remember them:

God grant you till you are dead
An honest piece of daily bread
On which your teeth to try.

RESPONSE TO THE ADDRESS OF WELCOME.

BY DR. TRUMAN W. BROPHY, CHICAGO, ILL.

Mr. President, Ladies and Gentlemen:

Up to the present time I have always assumed that the President of this organization was a man of good judgment, but I find him just now taking a position which convinces me he does not always act wisely for he has asked me to respond to the eloquent address made by the representative of the city of New Orleans. It is gratifiying to us, and it is a matter of great pleasure to us to meet with you in this beautiful and hospitable city. We have come long distances—some of us more than a thousand miles—and all because we wanted to enjoy the hospitality of your people, the beautiful climate you are giving us, and engage in the work that is nearest our hearts.

We regard this association as one of the greatest forces in our educational work. The most prevalent diseases known to the human family are diseases of the oral cavity. These diseases are chiefly of dental origin, and we represent that class that has to do with the most prevalent diseases known to the human race.

We are here for the purpose of comparing notes, meeting with one another in a social way, and for the advancement of the best interest of our profession. We look upon our work here with pleasire; we have charge of a great fund, or the administration of a great trust, which has been given to us, and which we have been delegated to us during our lives for the interests of humanity; and we propose to discharge our duy to the best of our ability.

We are grateful to the people of New Orleans for the hospitality they are extending; we are really ambitious to make this t record meeting, and I believe when the history of the work of this organization has been written fifteen of twenty years hence, we will find that the meeting held in New Orleans on the last day of the year of 1907, will rank high in the history of this body.

I thank you very heartily for the welcome you have extended to the Institute of Dental Pedagogics. I thank you.

RESPONSE TO THE ADDRESS OF WELCOME.

BY DR. FRIEDRICHS, NEW ORLEANS, LA.

I certainly shall be brief, but I wish to express my gratitude for your presence here to-day. I feel that I was particularly instrumental in getting you here, and after many years' efforts on my part, and through the urgency of my faculty, we have been able to get this body here. Year after year I have urged that the meeting be held here, so much so, that for some reason or other, at the New York meeting I did not make my usual address. Dr. Brophy got up and said "Friedrichs, we have not heard from you," so I knew at once what was expected of me to do, and I made them the same speech that I had made on several occasions before. We are, gentlemen, unable to give expression in words of the feelings that we really experience; I find my vocabularly in the English language is absolutely inadequate for me to express myself like I should. I feel that I cannot do it, but, gentlemen, I want to show you how grateful I am to you, and I think every man in the city of New Orleans feels that same gratitude. Now, I say the meeting of a body like this— for this is no ordinary meeting, if we take into consideration the fact that the gentlemen present at this meeting are the men who mould the profession; and the minutes of this body will stand out pre-eminently, and this distinguished set of men will not leave anything behind but a reputation that will stand as a monument to its history, and will help to make up its history. I believe that each man feels proud of his association.

Now, gentlemen, I want to say something about the weather. The gentleman who furnishes us this weather was in direct communication with me, so you will have to thank him for the rare weather we are now enjoying. You are going to have the finest weather from now on until you finish the meeting of this association. You do not know what a privilege it is to get in communication with His Royal Highness. There was a time, gentlemen, when a man could go out in his back yard and talk to him, but that time has past, and we in the present day can get no notice from his August Majesty in any such manner. However, this is the sort of weather I have been promising you for the last fifteen years, more or less. Now, gentlemen, I do not wish to say any more about it.

So far as any inducement is concerned, and so far as our appreciations are concerned, I do not believe I need talk about that. I think we have tried to give you some practical illustrations. If there is anything necessary for me to say in this particular, and if there is anything you have not seen that you want to see, simply ask for it, and it will be brought forth. It does not make any difference what it is, just so you let us know what it is, and we will then produce. There is nothing you cannot see, or of which you cannot know, for we are at the service of this great and glorious institute. Anything provided for in the mundane arrangement is yours for the asking. As our distinguished friend has just said, we want this meeting to be one of the historical events of this association; we want it to be a meeting of which the memories we carry away will be absolutely sacred; memories, gentlemen, that will be so magnificient and so beautiful that when you look back at them they will stand out like an oasis in the desert. Simply reflect upon the time you spent in New Orleans as one of the most delightful and beautiful times of your lives. That is what we want, and that is the kind of welcome we offer you. I want to see in the reviving of these memories of this event in the years to come that these recollections will be taken up by generation after generation, and that by the repitition of them they will become sweeter and more beautiful until they are woven into and become a part of the music of this world.

Gentlemen, you are welcome. I thank you.

PRESIDENT'S ADDRESS.

BY J. H. KENNERLY, M.D., D.D.S., ST. LOUIS, MO.

Dentistry as a distinct profession owes its birth to the foundation of the Baltimore College of Dental Surgery in 1839. The reason for the founding of this the first dental institution by two distinguished doctors of medicine, was that they at that early date realized the necessity for more particular instruction in dentistry.

The seperation of the medical and dental profession was not the creation of a specialty in medicine, but it was the creation of a distinct profession, which requires a definite course of instruction especially adapted for its successful practice.

The practice of dentistry requires a combination of practical art and science, with a superior proficiency of manual dexterity, which is not needed in any other branch of medicine, unless it be that of operative surgery. In fact, the dentist is the composite of the artist and artisan.

The occulist refers his patient to the optician for the mechanical construction of glasses; the orthopedist sends the necessary measurement for artificial substitutes of mechanical appliances to the artificial limb maker, while the major part of the work done by the dentist has to be done right there and then by himself in the mouth of the patient. The achievements attained by the dental profession as such are chiefly to be credited to the ingenuity of the dentist himself and rarely to the man of medicine.

Ever since the seperation of the schools of medicine and dentistry, steps have been taken to again reunite them, so as to make dentistry a branch of medicine, placing it on the same basis with opthalmology, otology or any other specialty of the mother science. The evidence of such a retrogressive step is amply illustrated by the fact that in those countries where dentistry can only be practiced by qualified medical graduates, very little progress has been made in dentistry *per se*; in fact, a large part of the practice is carried on directly by what is known as technical men, namely, men who have learned the laboratory technic and have acquired certain operative procedures from experience. Such men are in frequent use in certain parts of Europe to act as "straw men" in the dental practice of an M. D. Recently much discussion has appeared in foreign dental literature relative to the formation of so called stomatological societies. These societies are formed for the sole purpose of again trying to unite dentistry with medicine. Aggitation on this subject has gone so far as to exclude dentists from attendance at international medical congresses, in which there was a dental section, unless the attendant held the M.D. degree. Such was the case in the one held in Lisbon in 1906, and again the same clause is incorporated in the outline of the congress to be held in Budapest in 1909. It seems timely, therefore, to suggest some means which will establish our position very clearly and definitely before the world at large.

It should be remembered that dentistry is a specific part of the great healing art, which is practiced for the purpose of doing the most good to suffering humanity. Consequently, dental education is immensely concerned with the means and methods which furnish the very best advantages to the dental student in order that he may acquire a comprehensive knowledge of his chosen calling. To master the entire field of medicine, including dentistry, in a given period of time, would mean simply to possess a fair knowledge of general medicine. Medicine of the present day is so intensely complicated that a whole life time would be too short in whlch to become master of its integral branches. If we demand from the general dental practioner a complete medical education, it means retrogression, because the time required to complete the two courses, together with the expenditure would be prohibition to many, and, as a consequence, the public at large would be the sufferer. Any law requiring the combined study would be in favor of a few individuals only. However, dentistry is not studied to suit the individuality of a favored few, but to do the most good to humanity. Our object in teaching dentistry is to make of our students competent dental practitioners, and not half educated medical men with a smathering knowledge of dentistry. Froude has expressed this thought very clearly: "The knowledge which a man can use is the only **real** knowledge, the only knowledge which has life and growth in it, converts itself into practical power. The rest hangs like dust about the brain or dries like rain-drops off the stones."

The best dental education is the one which will fit the student in such a manner that he may render the best services to his patrons, Actual experience of half a century has amply and beyond a shadow of a doubt demonstrated the fact that such an education can be best obtained in a special dental school. It has also demonstrated the fact that in such countries where the medical degree is a preliminary essential for the practice of dentistry, these latter countries, generally speaking, have made very little progress, and that dentistry is often practiced even at this late day in a very crude manner.

All unnecessary medical studies are a burden which rob the student of much valuable time in mastering the fundamental branches. Again, I make the statement that in the actual practice of dentistry about nine-tenths of our labors are mechanical. By this I do not mean to be understood that our labor is the labor of a mechanic pure and simple, but that it is the same mechanical principles, based upon scientific study, upon which the surgeon performs his operation.

An ideal course of study in dentistry should demand the same entrance requirements as do the representative medical schools of the country. At present a four year course in an accredited high school is generally regarded as sufficient for entrance to the study of dentistry and medicine. A few medical schools, namely: Johns-Hopkins of Baltimore, and Harvard University require a B. Sc. degree or its equivalent for admission, while a few others, among them the University of Michigan, have arranged a six-year course in which the B. Sc. and M.D. degrees may be obtained simultaneously. There is no doubt in my mind but that dentistry will be compelled to follow in the advanced footsteps of the medical schools before the medical man will look upon the dentist as being his equal, for when they are convinced that the study of dentistry is in every respect equal to the study of medicine, our social recognition will be equal to that of the medical men.

While dentistry is closely connected with general medicine, a full and comprehensive knowledge of all branches of the latter is not needed for its successful practice. At the meeting of the F. D.I., held in Stockholm in 1906, the following studies were selected as being essential to the general education of the dentist: Physics, Chemistry, Anatomy, Histology and Embryology, Physiology, Physiological Chemistry, Bacteriology, Materia Medica and Therapeutics, general and special Pathology, general and special Surgery and Physical Diagnosis. These general medical branches, together with the special dental training will prepare the student far better to enter upon the actual practice of dentistry than if he were to possess a complete knowledge of the whole field of medicine. To complete a comprehensive course of study successfully, as above outlined, a four years course of study is essential. The writer is optimistic enough to prognosticate the inauguration of a four year course in the near future, in spite of the failure of this very proposition three years ago. Individually, the four year course will mean increased expense and lessened remuneration, and as a natural sequence the non-endowed college will have a hard struggle to make both ends meet. The future dental educational institution will be a department of a fully endowed university. Of the fifty-five dental colleges in the United States, less than a dozen have at present direct affiliation with universities. The few simple facts, relative to dental education, as outlined above, are the successive links in dental evolution. They are bound to become true and the sooner we recognize these facts, the more service we will render to our profession.

We, as teachers of dentistry, are looked upon as the ones who, to a large extent, shape the destiny of our profession. The history of the Institute of Dental Pedagogics furnishes the proof of this assertion. In this particular connection it is interesting to observe certain phases of the proceedings of the recent congress of stomatologists held in Paris, August 1-6, 1907. Among others the following resolution was introduced by a member from Hungary: "The dentists produced by the college system has always been a provisionary substitute only. There is no reason why this provisionary substitute should be further tolerated. It is to the interest of the health authorities of every country to abolish this system of education, the non-medical dental practitioner should be placed, by employing suitable transfer methods, upon the extinction list."

The absurdity of this dogmatism is amply illustrated by the fact that any duly qualified medical practitioner of Hungary without ever having acquired any special knowledge in dentistry may style himself "qualified dentist." In other words, he may foist himself upon the general public as a person who possesses sufficient knowledge to practice dentistry as a specialty. Fortunately, the few men calling themselves stomatologist will not shape the destiny of the dental profession of the future. The profession has grown too powerful as a social institution to be ruled or governed by a few who frequently, being not even members thereof, take it upon themselves to place the dentist produced by the college system upon the extinction list.

From an etymological point of view we understand by the term "stomatologist" some one who is engaged in the treatment of diseases of the oral cavity proper which, of course, includes the teeth, while a dentist is engaged in the treatment of diseases of the teeth and their sequallae. However, we attribute to the term "dentist" a much wider meaning at present. The U. S. Army regulations require the following services of the members of the dental corps; "The duties of the dental surgeon will ordinarily be confined to the treatment of such cases as are directly associated with the teeth and gums; but occasions may arise when his services would be required as a specialist in the treatment of diseases and injuries of the mouth and jaws; such as cysts of the salivary ducts, empyema of the maxillary sinus, fractures of the jaws, gingivitis, necrosis of the jaws facial neuralgia, stomatitis, and tumors of the gums, jaws, etc."

If the dentist in his routine practice is required to treat the various ailments as enumerated above, what is there left for the stomatologist? It seems to us that the term dentist when employed to designate one's calling is quite good enough to distinguish us from the medical practitioner and also quite sufficient to make the public understand what is meant by it. Why then create a new title which, in reality, means nothing more nor less than what is expressed by the simple term "dentist" and which only brings about confusion in the mind of the layity and makes us the laughing stock of our medical friends.

Discussion.

Dr. H. E. Friesell, Pittsburg, Pa. The president's address gives rise to a number of ideas, prominent among them being, the ever recurring consideration of the relations of Medicine and Dentistry.

We can have no quarrel with Medicine *per se*; but we should recognize that it, like Dentistry, has its big and little men, its efficient and inefficient practitioners. The MAN must be there first, before the M.D.,or D.D.S., degree can make him worth consideration. "The rank is but the guinea's stamp; the man's the gold for a' that".

The physician whose knowledge of his calling is sufficient to entitle him to judge has no quarrel with Dentistry, and no desire to foist the medical degree for medical education on the dentist. He recognizes the different requirements of these two branches of the healing art, and is well content to let alone that branch which he realizes he is not prepared to follow.

The dental sycophant who caters for the medical degree generally merits the contempt he receives; for he is usually the least capable of practicing dentistry.

Why there should be a desire to unite the two professions is a mystery. American Dentistry owes little to Medicine, which abandoned her at her birth; but the debt that Medicine owes to Dentistry is rapidly increasing; and when dentistry succeeds in keeping the mouth in a hygienic condition, half of the demand for medical assistance will cease.

So far as the recognition of the equality of the Dental Degree by medical men is concerned, we need have no fear nor ask for any favor. Dentistry is no more looked down upon by medicine than medicine is by other callings, the inefficient practitioners of both professions being the cause of this; for wherever there is one incompetent in Dentistry, there are three in Medicine.

Those dentists who seem to worship the Medical Degree appear to be ashamed of Dentistry, but Dentistry is big enough for any man. It is one of the most difficult and exacting of callings, involving not only the highest grade of mechanical and technical knowledge and ability, but a lightness and dexterity of hand and a keenness of eye not required in any other line of work, and besides these an endless patience.

A great deal of our work is mechanical, truly; but I see no lack of honor in that. Why should we be ashamed of mechanics? Mechanics demands the ability to reason correctly from cause to effect, and to produce the effect by constructing the cause; the ability to perform a thing, not simply to state in generalities how a thing may or might be performed. What are physics and chemistry but the mechanics of matter? What is physiology but the physics and chemistry of the animal body? Anatomy is simply animal mechanics. Much better for Medicine if it had more reliance on mechanics and less on bottled fetiches. It is my opinion that Dentistry is suffering more to-day in the public estimation through lack of mechanics than through a preponderance of the same.

In a number of ways the Medical Degree is a good deal of a bluff, and as Dr. Kirk has recently said "legalizes its possessor to practice a great many branches of the healing art which its curriculum by no means fits him to undertake." That it in no way qualifies a man to practice Dentistry intelligently can readily be understood if you will imagine what would be the result if the average medical graduate should attempt to practice Dentistry!

We must grant that all knowledge is good, and that it is impossible to say that any fragment of knowledge, however insignificant or remote from one's ordinary pursuits, may not some day be of value; but we must also recollect that in order to know a little **well,** we must be content to be ignorant of a great deal.

We can elevate and ennoble the dental profession much more certainly by making those who follow it masters of their craft—men who can truly do what they profess to be able to do—than by labelling them with all sorts of high sounding titles as a certificate that they have spent years in studying subjects having little or no bearing on their calling.

I cannot refrain from expressing a little pleasure at hearing our worthy president refer to the four year dental course, because I am as strongly in favor of that course to-day as I ever was.

For we must all realize that it is only in the closing months of our senior year that the average student really begins to get an intelligent grasp on what he has been stumbling through for the preceding two years. Then, knowing how little actual study the average practitioner does after graduation, it seems that if we had those men another year we would not only come that much nearer making them masters of their calling, but would stimulate many into habits of study and research which they would never adopt without such stimulation.

I am not so sanguine as my esteemed friend, the president, that the cure for all our pedagogical and professional ills lies in a skyscraping preliminary education. True, it would be easier to teach classes whose intellect had been cultivated to a higher degree, but as long as some of our men who are weakest in preliminary education turn out to be our very best men at the completion of their course, I cannot concede that everything is in the preliminary education. I think we can overstep reason on this subject, and that some of our members who are reaching out for a year or two of the collegiate course are doing some unwise straddling.

The war cry of the society dentist and of the State Board man has long been "Commercialism in the colleges", and "Elevate the preliminaries;" but when we consider that most of these vociferous brethren would be unable to pass the existing preliminaries, it seems as if they were only trying to kick down the ladder by which they climbed into the profession; and until the society dentists are willing to help endow dental colleges it seems rather bad taste on their part to howl "Commercialism".

I think the trouble with most of our schools is not commercialism but poverty; and before we push the preliminary education too high we need endowments, that we may have enough to pay our teachers respectable salaries that they may be encouraged and enabled to do post-graduate and research work, and also that we may be enabled to employ a sufficient number of capable teachers to insure the student more individual instruction.

One of our esteemed members, in a recent article, described the fact that the work of the dental profession has been mostly along mechanical lines and very slightly along the scientific; but, gentlemen, what has been the incentive to work along the scientific lines? We can't expect it from the ranks of the profession to any great extent. It must come from the real students of dentistry, "our dental teachers", and they can't go very far along those lines when they must make their living aside from their teaching. One other reason, too, should not be overlooked: dentistry is young, we haven't mastered the mechanical yet. When we have covered that field fairly well, the scientific side will not be neglected.

Dentistry is young—our teachers are only beginning to teach—with the crude means at our command, the results attained should most certainly make any man proud to be a dentist. When we contrast the condition of dentistry before colleges existed and now, we think that the colleges and college men are entitled to the greatest credit in giving dentistry what standing it has as a profession.

Considering these things, it seems ill fitting for any dentist to cry against the alma mater of his profession, when he is so evidently unwilling to help the college by endowment.

One other thought I want to leave with you while we are on the subject of raising the preliminary requirements: A considerable proportion of our people will allways be found in that stage of intelligence where the valuation they will place upon their teeth will be principally the relief of pain. With this tendency toward high preliminary and extended dental education, where are we to find dentists who will be contented to serve these people? Will there be two dental degrees ultimately?

Dr. T. W. Brophy,
Chicago.

I am sure that the members of the Institute must have something to say on this most valuable paper of our president. I see the time is passing and so I shall fill in the little interval before the others are ready.

I want to say, Mr. President, that of all the addresses I ever heard—and I have heard many on the subject of education and educational requirements, both primary and after entering the dental institution—that this is one of the best. This paper just delivered by our president epitomizes the whole subject, and presents to us the whole of it. Dr. Kennerly has read the best paper that I ever heard on this subject, and I want to thank him for it. His paper will be used throughout the world as an expression of the highest and best that America offers on the matter of dental education; coming from an institute which is the greatest factor in advancing the interests of dental education in our country, it will, I hope, develop the necessity of preventing, to a very great extent, the clamoring of men who are unconscious of what they say; men who are clamoring and seeking to place this great profession of ours under the control of men who have little or no knowledge of its necessities. It has been my privilege to study at close range the condition of the dental profession throughout the various countries of Europe. All of the traditions, strength and influence of the medical profession throughout Europe has been bearing down upon the little band of dentists that has been trying to elevate the profession. The President has told us that any man in a European country may, if he so desires, declare himself a dentist and practice dentistry with all of its privileges. The International Medical Congress, first in Lisbon, second in Paris, and next in Budapest, is standing in the way of dental progress. That class of men desire to dominate the dental profession, and those men are no more fit to practice dentistry than a dentist is to practice medicine. They are no more fit to determine, through their examinations of the dentists, whether those men should practice dentistry than the dentists in some other country would be to determine whether **they** are fit to practice medicine, and so we have this most unfortunate condition to confront. I believe that this institute takes a broad enough view of the matters pertaining to our profession to feel that we are not a little circle within the boundaries of this United States and Canada, we must take into consideration our brethren throughout the entire world. This work will be carried on through the instrumentality of the International Dental Federation, of which this institute is a part, but years of time must elapse before the dental profession in European countries can stand. There is a little coterie of men and women in the section of Stomatology of the American Medical Association, who have resolved to make dentistry a specialty of medicine. Dr. James Truman says that there are thirty-five thousand men and women engaged in the practice of dentistry in this country who are members of a profession in which they have never been educated and to which they do not belong, where they do not claim to belong, and where they do not care to belong. They have the means, and they are performing their work to the best of their ability.

I would like, Mr. President, to say something more, but I know that I have taken more than five minutes. I am not at all through, but if this body is to be methodical in its work I must stop. What our President has said of every profession and institution of learning in America will be felt throughout the entire world. It will be with no uncertain expression, and there will be nothing ambiguous. With the position we take that we are a profession, the same as engineering, and a part of the medical profession, because every engineer must use chemistry, and chemistry itself is a science as we all know. The word mechanics has sometimes been used by men as an expression of disapproval upon the dental profession, but let us look to its real meaning. We all see magnificient works of art created, and by whom? What was Reubens but a mechanic, else he could not have executed those magnificient paintings; what was St. Gordans, or he could not have created this piece of statuary; what was Raphael, Reubens, Van Dyke and Tarbell but mechanics. You must not speak of mechanics with anything else but the highest respect, because mechanics is to-day shaping the most important forces of the world. Mechanics is the means by which the idea of the engineer is expressed, and look about in this city and in other cities and you will see those magnificient structures, based upon the principles of mechanics.

Mr. President, I thank you for the time you have given me.

Dr. J. H. Kennerly, St. Louis. I have very little to say, in closing this discussion. I have been so highly complimented I cannot express to you my appreciation, for the kind reception of my effort to place before what I believed to be the proper body certain features of dental education as they appear to me. The question as to whether dentistry is a part of medicine, and whether we are recognized as a part of medicine, plays no part in my discussion or in my paper. I care absolutely nothing for it; I would sooner be the skillful dentist, capable of handling the cases as they came to me from day to day, rendering patients the service they demanded than to be the most skillful physician that ever practiced the healing art. I have studied this matter over from this point of view. We are constantly graduating men who are going into European countries who stand absolutely without any foundation. The medical graduate of the country to which he goes has every privilege, and many more than the dentist does not have, and yet we have apparently said or done nothing to relieve them. We have been relegated into oblivion by the Society of Stomatology. Some expression ought to come from this body. This is the teaching body, and, as such, to this body will look the profession of the future as to the outcome of the profession of dentistry. The teacher in the public school shapes the boy's mind in the proper channel he should pursue; and then he geos to the high school, and then the dental school takes hold of that mind and tries to develop it along the lines of his choosen profession. This is why we are looked upon to-day as the people who are shaping the profession in this association, in which politics and things of that kind are eliminated.

We are here at the sacrifice of time, our homes, and many other things, to try to improve our methods of teaching, in order that we may render better service to our profession, to the people who come to us, consequently from us must originate much of that which is best in the future dentist.

In conclusion, I can only say I wish to thank these gentlemen for their kind considerations of the address, and to assure them that I tried to place before them the various matters in such a way as to give them something to think about.

One statement was made referring to the fact that our profession was nine-tenths mechanical. I did not mean, as stated, that they were mechanics in the same sense as the man who lays stone, but the surgeon, no matter how skillful he is, is a mechanic. The most skillful surgeon we have in this country is the man who has the most mechanical skill, and so it is with the dentist, the artist, etc. It is the skilled man that is best qualified, and that is what our profession demands.

RECITATION TEACHING IN ORTHODONTIA.

BY CALVIN S. CASE, D.D.S., M.D., CHICAGO.

In a paper read before the Institute of Dental Pedagogics, December, 1903, I made the following suggestion relative to Recitation Teaching in Orthodontia:

"I have long believed that we will never arrive at the perfect teaching of Orthopedic Dentistry until text books are written relative to the practical technics of the work, that will enable us to present this portion of the didatic teaching in the form of recitations instead of the usual stereotyped lectures.

"With the latter method the student comes to the class usually with no knowledge of the subject that is to be presented; and when he leaves he is more often than otherwise in a mystified condition of mind, so that the little knowledge he has gained will not stay with him long, and as it is impossible for more than few to take intelligible notes of that which has to be taught with blackboard drawings, charts and lantern slides, relative to the various forms of irregularities and the construction and application of methods for their correction, the final result of our work on the candidate for graduation is something which we too often are obliged to simply close our eyes to.

"With the method I propose, the student would be able to come to the class fully prepared to answer all questions relative to the character or characters of irregularity and their treatment that were selected for the hour, illustrations of which are thrown upon the screen.

"If these are presented in a perfect sequence of arrangement, properly grouped and classified, the student is kept in intelligent touch with the teaching from the beginning to the end of the course.

"During the progress of this portion of the course, the teacher can amplify the work with his individual experience in similar cases, or the methods of others which he believes to be more practical, and other knowledge of importance not mentioned in the text."

When the above was written four years ago, I hoped to be able at an early date to put into the hands of my students a text book that would enable me to make a practical trial of this method but which I am sorry to say has been delayed until now.

Within these past four years our Dental journals have so teemed with the wonderful experiences of enthusiastic orthodontists who seem to believe that all principles and methods of regulating should be relegated to the past which are not founded wholly upon the quite popular ideas attributed to Dr. Angle and with the advocacy among many of the socalled "new school orthodontists" that this department of dentistry should cut entirely loose from the parent profession. I may perhaps be excused for some surprise at being asked for the third time to read a paper before this body upon the Teaching of Orthodontia as a part of the regular college curriculum. Especially as it is so well known that I advocate, practice and teach a very different system of regulating teeth whose aim I believe to be toward that higher plane of dental orthopedia in which the principal of normal occlusion is one of many important factors, and whose scope implies far more than it would be possible to attain by any limited system of inclination force appliances, confined to the arbitrary and radical practice of non extraction "in every case."

I have sometimes wondered how long it will be before the sunlight of a broader experience will sift out the false from the true—though it shatter many a high hope of easily won fame and fortune—and allow us as a truth seeking profession to come back to earth and to a fuller realization of the vastness of this branch of dentistry; its opportunities; its beneficent possibilities; its almost limitless demands upon the highest order of skill which humanity can furnish.

I think you will agree with me that in order to successfully teach orthodontia or any other of the allied arts of dentistry, there must be a perfect accord in the beliefs and practices of the teacher to the teachings of the text-book. And further: to successfully teach by recitation, the teachings of the text-book should be arranged in a perfect sequence of development from the rudiments of the art, up through the foundation principles, to the final practical application of the work in accord with the highest demands of actual practice.

How much of the science of orthodontia may be taught more successfully by recitations than by lectures I am not prepared to say. But this I do know, that when it comes to the teaching of specific methods of regulating, the student should have an opportunity to study and think out for himself the meaning and proper treatment for every distinct charactcr, malocclusion, and type of irregularity which he is most liable to encounter in practice. In this way he will soon learn individually to distinguish between that which may be determined by occlusion and that which actually exists. Also those marked dento-facial differences which exist between two cases having the same buccal occlusion, and other equally important things relative to the application of force.

With those irregularities that are susceptable of being classified (by which I mean: that when a class or a type of a class is fully stated there will at once be an intelligent recognition of the general character which distinguishes its main features from all other classes and types), the student should have an opportunity to study the general characteristics of each class as compared to other classes and the distinguishing feature of the types of each class as compared to other types of the class, that he may learn to recognize them and thus be able to supply the proper treatment for their correction. In this study there should be presented to his mind the probable causes which may have operated in its production; the advisable treatment, and the character of movements that should be employed and why; the appliances which are applicable; the character and direction of force the appliances are calculated to exert; and every detail to fit him for subsequent demands.

One of the main reasons why recitation teaching in this branch of dental orthopedia appeals to me is: that the student will have an opportunity of coming to the recitation or quiz, not only prepared and in touch with the work of the hour, but with a knowledge of far more than the time of a lecture would permit giving; and in fact much more than can be touched upon in the quiz. The teacher will then be able to drive home the most important features of the work with the assurance that it is being received by minds which are intelligently prepared to appreciate it.

The questions which may be asked in the recitation pertaining to the work should be carefullly and systematically prepared by the teacher so as to bring out all the important propositions and principles, to be placed in the hands of the students as a guide to their study. This will be one of the greatest aids in a study of the subject because it will sharply call attention to that which is considered of the greatest importance. In this connection I may say it is my intention to prepare a booklet of questions with Chapter and Subheading Titles in accord with the work, with blank pages which will enable the student to make a ready reference compend. The teacher will vary the questions, amplify the description according to his experience and judgment, and possibly throw upon the screen other methods which he considers more practical or applicable.

With this system of teaching, the regular course will be shortened, giving time for those most important and much needed epitomized reviews of principles which will now be more perfectly understood from the standpoint of a more general knowledge of the science.

In the former paper read before this Institute I divided Dento-Facial Irregularities into fourteen classes, which are exactly in accord with the different distinct characters of dental and facial abnormalities which malpositions of the teeth and jaws produce, and which consequently indicated the line of treatment demanded for their correction.

Believing it might simplify the process of teaching to group together under class headings, the different types that are similar in their main general aspects, the number of classes which I am now presenting in my teaching are reduced to seven. A number of characters which were described in the first classification as constituting seperate classes are now placed as types of other classes. In this work I have greatly aided been by the advice of Dr. H. S. Guilford and others.

In **Class I** of my classification is now placed every type which is characterized by a Maleruption of the cuspids. In **Class II** every type of Upper Protrusions with Lower Normal. In **Class III** every type of lower Retrusions. In **Class IV** every type of Upper Retrusions.

These four clasess comprise the principal dento-facial irregularities met with in practice. The three additional classes, which remain as before are far more rare; in fact few writers upon orthondotia mention them as distinct types, though in every one of these three classes are found the most marked and difficult to correct characters of dento-facial deformities. They are: Class V Bimaxillary Protrusion, Class VI Bimaxillary Retrusions, and Class VII Open Bite Malocclusion.

In as much as each of these classes produces a distinctive type of facial outlines that is peculiar to the class, they are very properly placed as an important part of classified irregularities, with the hope that they may be recognized and differentiated from other forms which are similar in occlusion, and whose treatment should be in accord to their dento-facial demands.

In order to give a practical illustration of the Recitation Teaching which I propose, permit me to briefly present a portion of **Class I Maleruption of the Cuspids.** It is divided into three types as follows:

Type A. Unilateral Maleruptions of Cuspids.

Type B. Bilateral Maleruption of Cuspids,—correctd with a normal occlusion.

Type C. Bilateral Maleruption of Cuspids,—corrected after extraction.

This Class is introduced with about three pages of printed matter which pertains to causes, differential diagnosis and general treatment. To give you something of the style and meaning of this work and to more clearly show the futility of presenting to unprepared minds of students a lecture pertaining to the important proposition involved, I will read a page of this chapter. Before doing so however, I will first read the questions which may be asked relative thereto.

Questions for Introduction of Class I.

What is meant by a Labial Maleruption of the Cuspids?

Why is it more frequent in the Upper Denture?

Name the different distinct types?

Name two of the principal Local Causes?

What effect does this irregularity have upon the lower teeth and why?

In the correction of the Upper is it ever necessary to regulate the Lower?

Does it ever arise from Constitutional or Inherent Causes? How?

What would the case have naturally become under this circumstance had not the Cuspids been forced into malalignment?

What are the three distinct dento-facial characters which may be indicated with the upper buccal teeth the width of a cusp in front of a normal occlusion with the lowers?

Introduction of and General Diagnosis of Class I.

"By far the most frequent of Classified Irregularities of the teeth is that which is characterized by a Maleruption of the Cuspids. The most common characteristic of this class is that of a labial maleruption of the upper cuspids. While this condition will frequently be found with both the upper and lower dentures it far more commonly occurs with the uppers alone. If in these cases it is accompanied with an irregularity of the lower, it will usually be a malalignment of the incisors with the cuspids more or less prominent, though fully erupted. The principal reason for the more frequent maleruption of the upper cuspids as compared to the lower, is principally due to the earlier eruption of the lower cuspids, which permits them to take positions before the loss of deciduous molars and the eruption of the bicuspids. It is also due to the fact that the temptation to prematurely extract the lower deciduous cuspids, to correct a seeming irregularity, does not arise as frequently as with the upper.

"There are quite a number of distinct variations in this class whose treatment differ quite radically, and which can only be determined by a careful and intelligent consideration of dental and dento-facial relations.

Causes.

"In a large majority of cases the position of the malposed cuspids is caused by the premature loss of the deciduous teeth, permitting an abnormal mesial movement of the buccal teeth with more or less retrusion of the incissors, partially or completely closing the cuspid spaces.* (Fig. 1) Not infrequently is it caused by a failure of the superior maxillary to properly develop, due to early naso-maxillary diseases, thus crowding the teeth into an abnormally small arch before the eruption of the cuspids. In nearly all cases the abnormal contraction of the upper arch will have forced the lower teeth into malalignment, demanding in correction, a concomitant enlargement of the lower arch to correct the occlusion and insure retention.

"In some instances the mesial movement of the buccal teeth will amount to a complete jumping of a cusp and a perfect mal-interdigitation.** (Fig.2) Occasionally the mesial malocclusion of the upper buccal teeth is partly or wholly due to a natural or inherited protruded position of the buccal teeth, the cuspid spaces being partly or completely closed in these cases, by a retrusion of the incisor teeth,permitted by the premature loss of the deciduous cuspids, and brought about by the muscular action of the lips—while little or no mesial movement of the buccal teeth has taken place. This retrusion of the incisors entrapping the cuspids, has prevented the case from, perhaps, assuming a typical upper protrusion. I say "perhaps" because it should be remembered that in all of these cases the same rule obtains in regard to the dento-facial relations of the buccal teeth in malocclusion as in other irregularities. In other words, the dento-facali relation of the buccal teeth with the uppers fully the width of a bicuspid in mesial occlusion, may indicate a typical upper protrusion; a partial protrusion of the uppers and a partial retrusion of the lowers; or a typical retrusion of the lower teeth. (See Classes II and III) These principles are well defined and illustrated in Chapter XV.

"Particular attention is called to these facts to show the need of an intelligent diagnosis, based upon dento-facial relations and not upon occlusion alone, in all irregularities of this class, as in all classified irregularities.

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*See Fig. 30 Chapter XIV Georgia.
**See Fig. 32. Chapter XIV Winston.

This is followed by throwing upon the screen the different types of the class, and their variations, from the simplest to the most pronounced forms, with the apparatus which may be employed for their correction, the description of which the student has become familiar.

That you may see what this means, with your indulgence I will present type A as it appears in the text-book, first reading the questions.

Questions for Type A. Apparatus 66.

What is a Unilateral Maleruption of Cuspids?

Describe in general terms Apparatus 66?

Describe the bicuspid T-tube attachment; the special object of the method and its function?

Why not solder the distal end of this tube to the molar band?

State the forces which the arch bow exerts?

What is the object of having a nut at each end of the left molar tube?

Under what conditions would you tighten or loosen the bow at this point?

If the distal movement on the right is not sufficient to place the buccal teeth in normal occlusion, what is indicated?

Apparatus 67.

Why is this apparatus different from the former one?

What is the object of the arch bow here?

What are the forces exerted and function of the lingual portion of the apparatus?

Describe the construction of this portion of the apparatus?

What is the object of the screw jack and how may its force be varied?

Variation. Fig. 5.

What particular condition indicates the application of the Ap. shown in fig. 4?

What is the function of the left **distributing bow; the Jack;** and the right **push bar**?

As the bicuspids move to the right, how do you prevent the bar from acting upon the lateral?

Type A. Unilateral Maleruption of Cuspids.

"When a cuspid is prevented from properly erupting because of a partial closure of its space, it will frequently be impossible for it to align itself unaided through the natural influences of growth, because of the general contraction of the arch from causes that continue to exert their influence, even to driving the lower teeth into malalignment.

"A **unilateral irregularity** of this type is often more difficult to properly correct than one that is **bilateral,** because of the greater skill and peculiar application of force required to keep the arch in symmetrical form.

"Fig. 3 shows a practical case in which the cuspid space was entirely closed. The contraction of the upper arch had contracted the lower, crowding the teeth into malalignment, demanding a concomitant enlargement of the lower arch with that of the upper.

Apparatus 66.

Apparatus 66 is well calculated for regulating slight unilateral irregularities of this character. Please notice the plan of these drawings which are characteristic of the work. Beginning with the occlusion, then showing side views of the apparatus and separate bands on the teeth, then the palatal views of the apparatus in place and disassembled. One end of the **arch bow** No. 19, rests in a **buccal T-tube attachment** on the bi-cuspid (B65), the distal end of which is supported in a molar **open-tube attachment** (B87); the combination being calculated to promote a distal inclination movement of the buccal teeth. (See movable Anchorages). The other end of the bow is adjustably fastened with two nuts to the left molar **tube attachment** (B 75). The bow carries a fixed **lug tube** "a" soft soldered at a point to engage with an **open tube** attachment on the lateral band. Instead of the **lug** "a", the thread of the bow may extend mesially to carry another nut—as in the disassembled apparatus—to engage with the lateral through the medium of a **sliding tube,** as shown in Fig. 3. This combination permits lessening the direct stress upon the lateral by unscrewing the **lug nut** "b" with a distribution of the protruding force of the bow upon all the incisors.

"The incisor bands with hook or open-tube attachments, clasp the bow to force the teeth forward with its movement. Should one or more of the incisors be so far in lingual malalignment that the bow cannot be sprung into the attachment at first, or should it be slightly malturned, place bands 6, or 7½, for wire or silk ligatures to force them to place.

"The expanding force of the **nut** at the mesial end of the **Bicuspid tube** forces the incisor teeth forward and to the left, with the bow. The lateral movement of the incisors can be aided or prevented by a pull or a push movement of the bow at its left anchorage. The reaction of the protruding force will tend to retrude the right buccal teeth to normal occlusion by virtue of free inclination action of its peculiar attachments. (See moveable Anchorage.) If it does not fully accomplish this—as might occur in Apparatus 67 — the **intermaxillary force** will be indicated.

Apparatus 67.

"When the cuspid space is more completely closed and the arch proportionately contracted, a greater degree of expanding force for the general enlargement and symmetrical expansion of the arch, will be demanded.

"In Apparatus 67 the **arch bow,** Nos. 19 or 20, with a fixed **lug** or **nut** to engage with the right lateral is principally for the purpose of alignment, to keep the arch in symmetrical form and aid in the correction of minor alignments, etc. It however aids in the distal movement of the buccal teeth by acting directly upon the molar. The lingual appearance is unique in its adaptability for retruding the buccal teeth, and is one of the most common methods in the author's practice. The possibility of applying the reaction force upon the molar and at any moment transferring it to the bicuspid, with attachments that permit free inclination movement, is ot the greatest advantage.

"The mesial end of the **lingual push bar,** No. 16 or 18, is received into a **flattened tube attachment** on the right lateral **band 24,** with an extension to engage with the central to distribute the protruding force. The left lingual distributing **bar,** No. 18, is threaded at its extreme mesial end to screw into a **threaded tube attachment** on the left central **band 14.** This done to preserve the rigidity of the bar which would soften if soldered to the band. Should it be found desirable tha this bar exert a push or pull force upon any tooth or teeth to which it may be attached, it can be threaded at the distal end for nuts working against the lingual tube on molar **band 81.**

"The lingual **open tube attachment** on left cuspid band 31, is to prevent the bar from sliding on its lingual face.

"The **bar rest jack** No. 16, can be located at any point best adapted to exert the proper lateral force. As its general location will be near to the incisal alveolar ridge, a **straight jack** will not usually interfere with the functions of the tongue after the first few days. Should it be found to do so, the **drop jack** shown in apparatus 17, or the **rac jack** will be indicated.

"An effective variation in the above apparatus, is shown in Fig. 4, which is particularly applicable when nearly all of the expanding movement from the **jack** should be brought to bear upon the right bicuspid area, by distributing the reacting force of the **jack** to a larger number of teeth on the left through the medium of the **lingual distributing bow.** This bow No. 18, extra hard is attached to the right lateral by soft soldering it into the **tube attachment,** (B 18).

"It will be seen that the force of the **jack** upon the **bow** will aid the direction of the required movement by its tendency to carry the incisors forward and over to the left. As the bicuspids are forced to the right,in connection with the movement, the straight **lingual push bar** should be bent with the bending pliers, in proportion to the demands of their changing relations to the lateral and to permit the latter to move to the left if required. If it is desired to place the the **jacu** upon the **distributing bow** at a point to exert a more direct force upon the incisors, a **locating lug** or **nut** should be attached to prevent the **jacu** from slipping."

This ends the description relative to Type A, Class I, which in its specific character is a fair sample of the whole work pertaining to other types and their treatment.

The questions that will be put to the class will be from a prepared list pertaining to the most important features of the work. In order to cover the ground then as rapidly as possible, if a question is not satisfactorilly answered I will either briefly answer it myself and go on to next, or if it is of much importance I will ask those of the class who can answer the question to hold up their hands, from which I will select the one to answer it. If it is then not satisfactory I will answer it in full.

A strict marking of those who are called upon will be recorded so that the questions will be fairly distributed; though a student should never know but that he may be called upon at the next recitation.

There is nothing as you well know, that arouses a student to greater activity than a quiz; especially if he knows that a record is kept to count, for or against him, at the final examination.

I believe that I shall be able to arouse a far greater interest in Orthodontia and to teach this branch of the work more thoroughly and systematically than ever before.

Discussion.

**Dr. Lischer,
St. Louis, Mo.**

Broadly speaking, I agree heartily with all of the fundamental suggestions presented by our essayist, because I regard Dr. Case's paper as a timely recognition of some of the most important phases connected with the teaching of orthodontia. In attempting to discuss it I wish to call attention to the great stress he lays upon the necessity of establishing a proper laboratory course prior to clinical practice in the infirmary, and the senior course on treatment and the various practical problems of the art.

It has always seemed to me that the problems confronting us in the teaching of orthodontia had a parallel in a subject like operative dentistry. Dr. Case's paper, I believe, silently emphasizes this contention. To illustrate, let us here recall the able papers of Black, Cattell, Johnson, and many others, and let us remember that all of them had one aim in common, viz., an attempt to systematize our methods of operating and to make it possible to adopt a fairly uniform method of teaching the technical proceedures of the art of filling teeth.

The adoption of a classification of cavities as to character, extent and treatment was the foundation upon which was erected the order of proceedure now generally accepted by all teachers of operative dentistry. We then turned our attention to instruments and instrumentation and the result is familiar to all. Indeed, the present scientific method of teaching this most important branch could never have been achieved but for the epoch-making essays of the members above referred to.

I confidently believe that a similar progress can and will be made in the teaching of orthodontia. Dr. Case is to be congratulated on forcing our recognition of these problems at this time. His paper is a fine beginning of an important movement, and while we can hardly hope to immediately agree on many minor details necessarily involved, yet it is only by discussions of this kind that we will, ultimately, arrive at that uniformity of methods so greatly desired. It is not my purpose to critically discuss these details at the present time. I thank you.

**Dr. Jackson,
Indianapolis, Ind.**

I have enjoyed reading Dr. Case's paper as I have most of his articles during the last five years. His ideas are so practical that they readily appeal to the progressive orthodontist. I agree with the essayist in his contention, that the student would acquire a better knowledge of the subject in a short time by means of recitations than by means of lectures alone, providing the teaching of the text book are in accord with the beliefs of the teacher.

However, the methods of different authorities on the subject of orthodontia, are so at variance, each having as many good points which the teacher wishes to present to his pupils, that it is practically impossible for the teacher, who is not an author, to adopt other than reference books and he must depend principally on lectures.

In addition to lantern slides and blackboard illustrations, I have been greatly assisted in my lectures by the use of a variety of appliances, embodying different principles and methods, made to fit a large papier mache model. The appliances are made of brass and are large enough to be easily seen from any part of the lecture room.

These are followed in their proper order by a variety of retaining appliances of the same size.

I have for some time been trying to work out a satisfactory method of carrying out the idea suggested by Dr. Case in this paper, namely: that the student should have the opportunity to study and think out for himself the proper treatment of every distinct character of malocclusion.

During the last months of the school year I give the class, at each period, articulated casts of a case of malocclusion accompanied by a description of the case. These casts the student studies at his leisure each being required to outline, briefly in writing, his method of treatment, naming appliances and retainers he should use.

These outlines are presented and discussed at the next quiz, the instructor, of course, concluding by giving the proper treatment, etc.

Dr. Case's new classification seems to be quite an improvement over his previous one, but I am interested to know where he places inferior protrusion.

I am anticipating much pleasure and profit by reading Dr. Case's new book.

Dr. Weiss ,
Minneapolis, Minn.

I desire first to express my approval of the essayist's satire upon the "New School of Orthodontia" for it seems to me both timely and justifiable. Far be it from me to utterly decry the so-called "New School of Orthodontia" for I feel frank to say that I believe much good has been accomplished thereby, particularly in checking the unwise extraction of teeth so frequently met with in the past in attempting to correct irregularities of the the teeth; however, that the problems of orthodontia are now so simple that the only difficulty to be overcome is mastering and understanding of normal occlusion, I can not admit. I feel impelled to say that in order to treat irregularities of the teeth successfully, it still requires much skill and understanding on the part of the dentist, and no mean fidelity and fortitude on the part of the patient. Much more might be said here but as this is not the topic under discussion we will turn to the question before us. The essayist would banish the lectures from the course of study in orthodontia and in this I most heartily agree with him, provided he or some one else will give us a satisfactory text-book. The general trend is to supplant lectures by recitations in most courses of study. In the medical department of the University of Minnesota where our dental students take their primary work as anatomy, physiology, chemistry, etc., the didactic work is done almost entirely by recitations where a few years ago the lecture course with occasional quizes was in vogue. This is readily practicable since these subjects are well worked out, there being little or no difference in the texts of the various authors. Orthodontia however, is a comparatively new branch of dentistry, and the doctrines set forth by many are yet so much at variance that it would seem to be well nigh impossible to produce a text book-that would be satisfactory to all teachers, therefore I am at a loss to see how the lectures can be abolished. From the paper I infer that the essayist has brought forth a text-book. I have not had the pleasure of seeing a copy tho I have long hoped to do so for I have had reason to believe Dr. Case would give us a text-book which would fill our needs better than anything heretofore published.

The essayist quotes from his book upon classification of irregularities—he having classified all irregularities under seven headings. I find that he has omitted protrusion of the lower jaw in his classification. I am at a loss to understand why this was done. This is by no means an uncommon type of irregularity, and since he has classified bimaxillary protrusion which is admitted to be somewhat rare, it seems to me that protrusion of-the lower jaw should be provided for in a classification of irregularities of the teeth. It seems to me that a comprehensive classifiaction of irregularities is all important since only in this way is it possible to diagnose cases of irregularity intelligently and indicate general lines of treatment. As to the value of recitation teaching I think there can be no difference of opinion. In my class work I endeavor to devote a little time at the beginning of each lecture to a quiz upon the lecture of the previous hour, and I am thoroughly convinced that without these quizes the vast majority of the class would have only imperfect ideas of the subject presented.

I also agree with the essayist regarding the preparation of lists of questions. I should even go farther and, either answer them or indicate the page where the text may be found covering the question. I have for several years used lists of questions prepared by myself for quiz work. The lists were prepared and used for two reasons; first to avoid the omission of important questions in sequence, and secondly to save time by the student interpreting the question correctly as soon as the question is stated. I have found, as others have, that it is often harder to ask questions than it is to answer them. No doubt every teacher who has quizzed classes has found that it is frequently difficult to ask a question—without practically answering it—which can not be interpretted in more than one sense, and the result is an answer which was not wanted at all, and yet the answer may not have been wrong. In this way one is enabled to learn how to state questions in order that they may be correctly interpreted by the student, and then by recording the question for making up a revised list it enables one to state the question correctly at a subsequent time. The subject of orthodontia is so vast and complex—the "New School of Orthodontia" to the contrary notwithstanding—and the time at our disposal for this work is so limited, it becomes very necessary to crystallize certain fundamental principles in the students' minds in order that certain landmarks may always be found which will shed light upon any problem in hand. Then too, there are so many ways in which little losses of time occur in our colleges that any means which will enable us to avoid this should be gratefully welcomed.

Dr. Tileston,
Louisville, Ky.

I know very little about the teaching of Orthodontia, never having taught it at all, but as pedagogues we are all interested in the methods of teaching, whether they be orthodontia or something else.

The recitation method of teaching students is peculiarly applicable to those sciences which are fully developed and are always the same, such as anatomy for instance, You may say: "Learn your lesson from this page to that page, and then I am going to see how much you know about it when you come to class." That is all very well in those subjects, but in subjects involving modes of practice, the methods may be different with every individual.

I do not see how a text-book can be arranged, except by each teacher for himself, and be satisfactory for the recitation method, to apply to subjects like orthodontia, operative and prosthetic dentistry. I do not think anybody could write a text-book on Operative Dentistry that would impart to my students what I want to teach them, page by page, and which I could use for recitation teaching. I might write such a one myself, but then if it would not suit any other teacher.

Dr. Byram,
Indianapolis, Ind.

I am not an orthodontist, but I wish we could develop an interest in Dr. Case's paper. He asks as a question: "Describe apparatus No. 66." Now, I simply wanted to ask him if he teaches his students to describe by figures numbers, or whether he asks them to describe an appliance for a certain purpose?

Dr. Case.—Oh, no; following that is given apparatus 66, and it is thrown on the screen. That question is not asked until the picture of the apparatus is before the student. I simply speak of it and it is described in general terms while the picture is on the screen before the student.

Dr. Byram.—Would it not be better to describe an appliance for whatever was indicated without reference to the figure number?

Dr. Case.—That opens the quiz. Ask the student to describe in general terms some apparatus; you can call it by number or say this apparatus; You may stop him before he has gone very far, seeing that he understands something about the appliance. Then we take up, as my questions indicate, the details of the apparatus, asking what this and that is for, and what various portions of the apparatus do, how the appliance is applied, what forces a certain portion of the apparatus exerts, why it exerts that force, etc.

Dr. Webster.—That is a vital point Dr. Byram has brought up. Are we to teach from appliances or from conditions to be treated?

Dr. Case.—Both.

Dr. Webster.—It should be from one or the other. My opinion is that we should treat conditions first, and the appliances secondary.

Dr. Case.—Sure.

Dr. Webster.—Then we should not begin with the appliance.

Dr. Case.—This which I have shown under apparatus 66 is not the beginning of the recitation upon this irregularity, nor is it characteristic of the beginning upon any irregularity. It is merely to show the character of teaching when we come to the apparatus, which is applicable for the irregularity which has been taken up in full detail previously.

Dr. Byram.—I teach another subject, and the reason I ask this question is because I am cutting out or discussing the names of Logan and Richmond in crown work. I want my students to describe that crown according to its application and usage. You say "Describe apparatus 66." That is the primary object then.

Here is another point I would like to make at this time. We are constantly sending our students before different state-boards, and if Dr. Case teaches his boys to remember that as apparatus 66, when they get before some state-board, where are they then?

Dr. Case.—I am in perfect accord with the sayings of these members. I think you see why we take up first the condition, and the general classification of the irregularity. We divide these into their various conditions or types, if you please, and then the different types are taken up and described fully, the peculiar characteristics, its causes, and the general treatment. The questions are then over that part of the work; first, as to the primary condition of the irregularity and the details, and then we take up the apparatus as a secondary consideration.

In regard to the question that came up relative to protrusions of the lower in the classification, it really occurs as types of two or three classes. It will be found in this work as types of upper retrusions, which are fully described and illustrated with halftone cuts; (A voice)—After you have covered the work with your own system first, do you cover it again with any other systems?

Dr. Case.—I dislike to have my work in Orthodontia spoken of as my system. I do not like that. I have never pretended to have a system; that is, as we understand the several systems for the regulation of irregularities of the teeth. Let us apply the forces and appliances to the teeth according to the laws of mechanics and according to the physiological possibilities of the movement of the teeth; let us adopt the highest, most practical, and most scientific principle, and let us not designate it as any one man's system. If there are better ways than I have described—and those ways are according to the highest principles of teaching and of science—let us have those, but do not call it any one man's system.

In regard to the question as to whether I teach the methods of others, I wish to say, I simply teach what I have found best and most practical in my own practice, and I would not practice these principles if I did not believe them to be true. Where I employ the methods of others which are original with I am always glad to give them full credit. If I adopt other methods, I speak of this or that gentleman as the inventor of the appliance and of certain ideas he has in regard to the movement of teeth, etc. I do not claim to be the whole thing.

DR. HILLYER.—There is another thing I want to ask, but I do not know whether it is pardonable or not. I have met with the assertion from a good many of the new school of orthodontia, that appliances should be cut out of our teaching entirely; I have wondered whether this is wise. Personally, I do not like to see the making of appliances eliminated, for I believe it is the working of metal that the student should experience, and that he can not get too much of it.

The reason I ask is this: circumstances, of course, happen to be peculiar with me. The death of my predecessor, Prof. Littig, has placed this particular branch in my care for this year, and I have worked very, very hard since last June to prepare what I thought best for this year. I have tried to cull out of all, the best; whether it be called systems or methods, or what you please. We must as Dr. Byram has indicated, prepare men for all sorts of conditions and examinations, and if they get through, they must work out their own salvation. It is a question as to whether we should get down to the basis of our personal opinion and then follow that to the exclusion of everything else; or whether we should give what we consider to be the best and what is practical, and then by comparison, perfectly frankly, perfectly honestly, compare one method (I won't use the word "system") with another method.

Now, I have traveled a long way to get at this particular thing, it is one of the things I came here for especially, and if I can find out what is best, I do not believe that I have traveled in vain.

DR. WEBSTER.—I am very much pleased, indeed, to have heard Dr. Case's paper, and I am especially pleased to know that he has undertaken the work of presenting us with a text-book. We have things written upon the subject which are not text-books, but what we need is a text-book. It has taken Dr. Case ten or twelve years to write this book, because he told me that long ago that he was preparing one, and I shall be very much pleased, indeed, to read it, although I do not teach orthodontia at the present time. But he has opened up the subject of how to teach, which is a general subject. What he has said relative to the subject of Orthodontia relates to any other department just as well. I have noticed in my experience as a teacher that the kinds of pupils we have now are not the same as we had ten or fifteen years ago, when we received students, not direct from the public or high schools, but men who had been in other callings for some time; whereas now we receive students directly from the public and high schools who have been taught along different lines from those ten or fifteen years ago. Our students now are what we might call "pap fed"; they are not students who have gained their present knowledge from individual or personal hard work; they have been taught everything. "The bringing-up process" has been worked upon them to the extreme, and now when we receive them in our colleges and throw these young men on their own responsibilities and give them work to do, they won't do it. Then we need the method of Dr. Case and a text-book, and we should force them to read it, so that they can not avoid it. The method of asking a pupil to read before he hears a lecture is proper. He may have a clinical lecture just before he receives his practical demonstration, and if he has studied the work he is then in a proper mental attitude to listen to the details and to attend lecture, but not until then. Ten or twelve years ago it was difficult for this body to understand how teaching could be done outside of a lecture room. To teach by demonstration in those days was hearsay today it is accepted.

Dr. Case.—(Closing the discussion) The last question I consider very important—the question of how much of the technic work shall be taught in college. A number of years ago I used to teach a great deal more than I do now. I am now teaching only that part which students when they get into practice will be called upon to actually perform. Brothers, in saying this, I mean a great deal more than the gentlemen who are encoring, are thinking about, because I believe a man who practices Orthodontia should know how almost every part of an appliance should be constructed. He may not construct it himself when he is too busy with more important work, but I do not believe that it is possible for any man to know how an apparatus should be made unless he can absolutely get right down at the bench and make it himself. This does not imply that an operator shall go out into the laboratory and construct an apparatus, yet if he knows how it should be done so as to give a perfect description to someone in the laboratory he is far better prepared to get what he wants than the man who cannot do this. In fact, I believe it is the only way he can be prepared to get what he wants. If he does not know that, he has to take what he can buy, and in nine cases out of ten that is not what he wants.

Another thing, and that is in regard to the work in the technic class in college. In my college we have no department in which the student learns very much, if anything, in regard to working of metals, especially that of steel. We have taken up the construction of some steel instruments, but we did that more particularly to give the student an idea of the working and tempering of steel, which in all departments is an advantage (although some think it is not). We teach him how to make threads upon wires, draw wires to a certain size, etc., so that he will be better equipped when he gets into practice. If he knows nothing about the practical conctruction of these implements he is very liable to be imposed upon with articles of no practical value or of far less value practically than otherwise would obtain.

The man who has been trained in the main features of constructing regulating appliances is far better equipped to order appliances—if he chooses to buy them—that are applicable to his case.

I thank you very much for your attention and the reception which you have given my paper.

THE TEACHING OF SUBJECTS NOT PREVIOUSLY PRESENTED BEFORE THE INSTITUTE.

BY A. E. WEBSTER M.D., D.D.S., L.D.S., TORONTO, ONT.

A course in Denistry should have but one object—to teach Dentistry—There may be some difference of opinion as to what Dentistry is. The definition is constantly changing and so must the course change. The course should not follow the definition of the lagards in the profession but should follow the definition of Dentistry as exemplified by the leaders. Their definition maps out a broad foundation and exact knowledge in each department. While it is impossible to give a student all of the details in any department, it should be possible however to give him a broad foundation, and the details in the essentials. The essentials are set forth in the chart before you and I shall only attempt to discuss the teaching of those sections which have not been previously presented by the methods hereafter mentioned.

DENTAL ANATOMY.

No dentist will question the necessity of knowing dental anatomy to practice Dentistry. Neither will any physician question the necessity of knowing general anatomy to practice medicine but every physician and many surgeons often know little of anatomy as might be exemplified from a written examination but they may know much of anatomy as exemplified from daily practice. It is the latter knowledge of anatomy that the dentist requires. It is not necessarily the names of the ridges, the grooves, the cusps and the pits on the surfaces of the teeth that the dentist needs to know but it is a working knowledge. A knowledge of the forms of the teeth. He must build a filling and carve a cusp for a crown. To know a score of the names of the markings of the tooth will not help him a whit unless he knows what he is going to make and can make it. The only way of learning the form of anything is to feel it and make it. It is not for the purpose of talking about the teeth that we learn their anatomy but for the purpose of making others like them. Then the only way to teach the student dental anatomy is to have him to attempt to form the teeth by both building and carving. And the only way we have of knowing whether he knows his dental anatomy or not is by the results of his work. I do not wish to minimize the necessity of teaching the names of the pits, fissures, cusps, surfaces, etc., because these are the means of communication, and without them the student could not think in the absence of the teeth nor understand his books or lectures which are to follow. The names may be learned as the carpenter's apprentice learns the names of the tools he uses. I might in passing state that the dental anatomy taught should include more than the teeth. It should include the arrangement, the articulation and the occlusion of the teeth and the anatomy of the gums and jaws.

INTRODUCTION.

The first lecture in dental anatomy should begin with generalities and at the present knowledge of the student. Discuss the mouth and what it is for. The teeth and what they are for. What creatures have teeth. Different forms in different animals. The purpose of these forms. The purpose of the different forms of human teeth. The students should be asked to look into each others mouths to note the forms of teeth, their arrangement, and how they come together when closed. They should note the form of the gums. At this point the teacher should show plaster casts to illustrate the form of the gums and teeth. Then show the bones with the teeth in place and how they are attached to the skull. The student is then ready to study the classes of the teeth their peculiar forms and names.

CLAY MODELING.

The demonstrator should illustrate the wedge formed teeth by clay modeling, the teeth five times the natural size. This must be done in the presence of the student and with all the helps that are available to him. A large tooth fifteen times the natural size is placed some distance from the demonstrator, and he explains how he looks at it to get a general idea of its form. Turns it from side to side, compares its length with its width mesio-distally and labio-lingually at the crown and at the neck. Lays the ruler on it and measures it in all directions illustrated in Black's anatomy. Since the tooth he is about to model is to be five times the size of the natural tooth the average measurements in Black's anatomy are worked out and placed on the board. Drawings may be made on the board to illustrate the tooth. A natural tooth may be placed in a piece of wax before the demonstrator. (A few words on how to work the clay is necessary). The tooth is modeled giving full description of each step and the form of each surface as it is made. Immediately each student is supplied with a board 12″ by 12″ and enough clay to make a tooth. He is expected to have Black's anatomy on his desk to read and to look at its illustrations. Upper central, lateral, cuspid, bicuspid, and molar are modeled. Each tooth is called for on certain days and graded. Those who do poor work are helped by the demonstrator. Quizzes may come at any time. Students are advised to carry a full set of natural teeth in their pockets for ready reference. His exercise should be completed in about thirty hours. While it is going on all the definitions should be learned. Teeth are modeled in clay because during the early efforts of the student he should work with some material that can be readily destroyed and worked over, and that he can immediately get at making a tooth form. The student is required to buy a ruler with the metric system of measurement on it. With this he measures the teeth he makes so that he may train the eye to proper sizes and forms. Later he will not need the ruler. The teeth are made five times the natural size because they are large enough for him to see the general form and the detail.

IVORY CARVING.

The next exercise is to carve twenty eight teeth from vegetible ivory blocks which are sawed out into large sizes for molars and small sizes for bicuspids, cuspids and incisors. Bone as suggested by Dr. McMillian will serve the same purpose. If for any reason the demonstrator thinks a student will make a failure in carving ivory it is wise to have him carve a few teeth in plaster of paris first, so that he may not waste his time and his money in destroying ivory. The demonstrator begins this exercise by a clinical lecture followed by a demonstration. The teeth are all blocked out first to approximately the proper size. All the wedge shaped teeth first, the bicuspids next and then the molars. Following the sound principle in teaching generalities first, details last. The teeth all blocked out the student begins to put finer detail in the incisors, for assistance in this he listens to a discussion of the details by the demonstrator who uses large models and drawings, the students following with the natural teeth in their hands. At any moment a student may be asked to describe a surface of the tooth he holds in his hand, or make a drawing on the board. Black's anatomy is always present, and that portion covered in a clinical lecture and demonstration is prescribed to be read for the next day's recitation. The recitation counts on the term work. When the anterior teeth are carved they are handed in for inspection. The bicuspids are next handed in and the molars last. Definite dates are set for handing in work. Those whose teeth are not up to the standard are given all the assistance at the disposal of the demonstrator. We have one demonstrator for fifty-six students besides the Professor, who gives the clinical lectures, demonstrations and quizzes. When the twenty-eight teeth are carved they are set up in wax and the contact points made to come in their proper locations and the proximal surfaces polished. This exercise should be completed in sixty hours.

Clinical lectures and demonstrations are given on the articulation, occlusion and arrangement of the teeth. Skulls and plaster casts may be gotten by the student from the museum to assist him in his work. He reads Black's anatomy as before and is quizzed on it. The gums are studied from models and carved in wax. The teeth which have been set up in wax are now invested and a low vulcanizing rubber packed in where the wax was.

A few facts about the handling of vegetable ivory. It is a wood and has all the physical qualities of wood. It will absorb water, especially dirty water, will swell and become quite soft, and will check if dried rapidly. When dry it is exceedingly hard, short in grain, takes a fine polish and is strong.

INVESTING.

The model is waxed upon an articulator whose bows are removable. This may be invested in an ordinary flask with the teeth downwards in the closed flask and the lid pressed upon the bottom of the model. The wax should if possible be removed without using water because the teeth will swell a good deal if wet and will spread when dried out, besides they are more likely to check.

PACKING.

The rubber must be carefully packed because it does not become so fluid when heated as that used in vulcanite dentures.

VULCANIZING.

The rubber is vulcanized in boiling water, time: thirty minutes. As it ages it continues to harden, but at all times is flexible enough to permit the separation of the teeth for operative purposes.

It is impossible for me to go into the details of how to teach the arrangement, articulation and occlussion of the teeth or the formation of the gums. The general principles have been laid down and illustrated in the forgoing pages. The internal anatomy of the teeth is studied from cut sections and etc. At the close of the course a written examination is held which helps to make the final grade.

What has been accomplished in the 130 hours spent on this subject? The student knows his dental anatomy and we know that he knows it. He has learned not only the anatomy of the individual teeth but he has learned how they approximate and antagonize each other which is at the foundation of filling teeth and correcting irregularities. He is prepared to do crown and bridge work and prostodontia. I know of no better way of teaching the kind of dental anatomy the dentist needs than by building a tooth and by carving it. And while he is doing this he is preparing for himself a model which he can use in nearly all the technique work required in a dental course. The usefullness of such a model has been many times mentioned before this Institute but on no occasion has its value been fully appreciated. I present you a few models to illustrate what technique work we make upon them.

TEACHING MODEL.

The next point I wish to impress upon this body is the advantage of having a large teaching model containing twenty eight teeth set in the jaws and surrounded by the gum. The whole model should be made fifteen times the normal size and set in a frame or articulator which will illustrate the arrangement, the articulation and the occlusion of the teeth. The teeth should be removable so that those having cavities may drop into their sockets. From such a large model dental anatomy can be taught and also every step in the preparation of cavities or in fact allmost any operation required upon the teeth. The advantage of such a large model and correspondingly large instruments so that the student can see from the farthest corner of the lecture room the details the professor is aiming to illustrate is beyond the question.

PLASTER TEETH.

Immediately after the student has seen a demonstration on the large model he should be required to prepare the cavity so demonstrated in a plaster tooth five times the normal dimensions. This size of tooth is convenient to carve and is large enough to see the detail demonstrated or illustrated in the large model. In most cities Italians can be found who make a business of making plaster casts from models. We have been able to secure these at five cents each. We supply each student with a central, lateral, cuspid, bicuspid, and two molars for fillings and the same for inlays. I am indebted to Dr. Squair of Buffalo for the suggestion of using these models. As soon as the student has prepared eight or ten cavities according to specified measurements in these teeth he is expected to supply himself with the necessary operating instruments including an engine and prepare the same cavities in his own tooth form. Note the help he has. A demonstration on a large model, make the same cavity in a tooth large enough for him to see what he is doing. A demonstration on the tooth form. Make the same cavity in his tooth form. Demonstrator going among the students assisting. The professor present at least an hour during each exercise.

Before I leave this part of the subject I desire to call your attention to the excellent quality of the model used for doing all kinds of porcelain work upon.

The teaching of prophylaxis has not yet been presented as a laboratory method nor has the examination of the mouth. The order of examining the teeth and what to look for are demonstrated before the laboratory class. (A chart is placed in the examining room for the use of students). A demonstration is given on the removal of deposits and stains on the teeth. Students are required to treat a set of natural teeth whose roots have been pressed into short pieces of rubber tubing and planted in plaster of paris. Upon such a model all the operations of removing deposits and stains and the scalling of roots can be done under the same circumstances and with the same difficulties as in the treatment of pyorrhea. The teeth are loose, the rubber tube will yield enough to allow the instrument to pass clear to the apex and yet it will hug it tightly enough to simulate the condition in the mouth. After an exercise of this kind the student will appreciate the difficulties of removing deposits from the roots of teeth. In fact if some practitioners who can always remove all the deposits from the roots of teeth would try such an exercise they might learn something, as others have learned about the filling of every root canal to the apex. Instruction is given to the patient on the use of water to cleanse the mouth and the teeth. He is shown how to use the tooth brush and what kind of brush to use and what medicament if any. After these demonstrations are given the class is taken to the infirmary at a time when no patients are present and each student is required to give the professor a demonstration in all he had seen, upon his class mate. At this time he must also demonstrate how to adjust the rubber dam and use napkins. This exercise is taken immediately before the student becomes an assistant to a senior. He acts in the capacity for some weeks, being entrusted with doing odd operations from time to time. Only such seniors are permitted to have assistants whose example might be followed and who are about to leave the infirmary. As the senior gradually withdraws from the infirmary his assistant takes over his work and carries it on without any annoyance to the management or break in the patients appointments.

Perhaps as many failures to succeed in dental practice are due to an inability to successfully meet a patient, examine his teeth, explain to him what ought to be done and make the necessary appointments and business arrangements as to all other causes together. All the patients who enter our clinic are examined either by a demonstrator or by a student in the presence of a demonstrator. We aim to use our clinical material from time it enters the building until it leaves. Lectures and demonstrations are given on how to meet a patient in the waiting room inquire his needs, take him to the operating room, talk with him, prepare for examination, adjust the chair, arrange the toilet, examine his mouth and teeth, make a record of what is abnormal or required on a chart, get his name and address, his occupation and any other needful information. Also what appointments he can make and the payments necessary. Answers all questions and explains what may be necessary for the patient's full understanding of what responsibility he takes and what responsibility the dentist takes. Each student who is on the examining list for the day is given such a demonstration with the first patient, then he is required to examine the remainder of the day being assisted and quizzed as the demonstrator sees fit. The examiner or professor of operative or prosthetic dentistry may drop in the examining room at any time and give the student his grade on this part of the practice of dentistry.

There are other special features in the teaching of operative dentistry which I should be delighted to present but for tiring you. I believe operative dentistry can only be taught to advantage when the professor is in charge of all of the technique, laboratories, gives the clinical lecture, the demonstrations, the general lecture, hears the quizzes, sets the examinations and supervises the instruction in the infirmary. It is only in this way that a broad plan can be laid down and all the details carries out. Keeping before him that it is men he is trying to make who will serve the people and the nation.

Dr. Webster, Toronto. Mr. President and Gentlemen:—I intended to present this subject in a little different form than I am. I intended to give a lecture on "How to teach Operative Dentistry" in some form, to use the same principles pedagogically, as I would in a lecture on "How to put on the Rubberdam," but being compelled to write it, I want to call your attention to the general pedagogy of the subject.

In the first place, I intended to write all of this down on this board. First the clinical lecture, second, the demonstration, and third, the practical exercise, and fourth, the detail lecture, or general lecture.

Clinical Lecture:— A clinical lecture is a broad introduction to definite demonstration. Its chief purpose is to connect the coming demonstration to what has gone before and show its bearings on the whole subject. It thus creates an interest.

Demonstration:— A demonstration is showing in detail the steps of the practical exercise which is to follow. It should be done so each member of the class can see. Both the clinical lecture and the demonstration should immediately precede the practical exercise and be given in the same room.

Practical Exercise:— A practical exercise is the work laid out for the student to do, and should be completed the same day if possible, that the demonstration is given.

Detail Lectures:— The detail lecture or the general lecture is only understood after a student has done enough practical work, and thus gained enough facts to think and understand from word pictures, diagrams, models, lantern slides, etc. These details should be given in a comfortable lecture room where the student can write notes. They should be delivered in such form that note taking is possible.

Chapter in text-book bearing on subject is to be read immediately following lecture. Then quiz or written examination immediately following.

The clinical lecture is a part of the introduction to a distinct demonstration. Its chief purpose is to connect the coming demonstration to what has gone before and to show its bearing on the whole subject. It thus creates an interest. Then comes the demonstration, a demonstration showing in detail the subjects of the practical exercise which is to follow. It should be done so each member of the class can see. The clinical lecture and the demonstration should be immediately succeeded by the practical exercise, and it is necessary that they be given in the same room; that is, I do not mean you should give your clinical lecture in this room, and then send the boys away and tomorrow give the practical exercise. This work is laid out for the student, and he should complete it the same day if possible that the demonstration is given. The general lecture is the one next for the student, for he has done enough practical work to understand the pictures, diagrams, models, lantern slides, etc. These lectures should be given in a comfortably seated room, where the student can write; they should be given in such form that note-taking is possible. Before the student is to listen to the general lecture or detail lecture, he should have a text-book and be recommended to read that part or chapter appertaining to the work in hand. Then he is prepared for anything you want to give him on the subject. You can go into all the details you please and he will understand them. Then after that, give him a good sound quiz on what you have been lecturing, and if he does not know it, go over it again.

Now, I hope to follow this principle in the discussion here of the teaching of subjects not previously presented to the Institute. I am not sure that I am right on that point. However, I am sure I am presenting something that has not heretofore been presented. Of course, teaching of Dentistry should have but one object—to teach Dentistry. There may be some difference of opinion as to what Dentistry is, but we should follow the highest ideals manifested by the laws of true knowledge.

First Year.—130 hours Laboratory.
- Dental Anatomy. (Black).
  - Introduction.
  - Definitions.
  - Clay teeth. (Five times natural size).
  - Plaster teeth. (Natural size).
  - Ivory teeth.
  - Arrangement.
  - Articulation.
  - Cutting sections.

Second Year.—200 hours Laboratory. 30 Lectures.
- Fillings
- Root Canals.
- Prophylaxis.
- Exclusion of Moisture, (Johnson.
  - Instruments and Instrumentation.
  - Nomenclature.
  - Classification and nomenclature of cavities.
  - Separation of teeth..
  - Preparation of teeth.
  - Matrices.
  - Filling materials and their insertion.

THIRD YEAR.—150 hours Laboratory, 35 Lectures, 200 hours Infirmary.

Principles and practices of Operative Dentistry, (Kirk, Marchall).

Root Canals.
Bleaching teeth.
Examination of stains and calculus.
Massage of gums.
Topical applications.
Exclusion of moisture.
(Napkins, rolls, holders, cotton, rubberdam clamps.)
Assistants to Seniors.

FOURTH YEAR.—30 Lectures, 200 hours Infirmary.

Pathology.
Science and Practice of Dentistry.
(Adami, Pathology).
(Burchard, Pathology).
(Black, Science).
Johnson, Practice).
Practical Thereapeutics.
Preparation of extension cavities
Inlays.
Infirmary.
Lectures.
Physical Laboratory.
Bacteriological Laboratory.
Pathological Laboratory.
Metallurgical Laboratory.

Discussion.

Dr. Strout, Boston. The paper of Dr. Webster seems to me one that should be helpful to every teacher of Operative Dentistry, or of Operative Technic.

I see in it much to commend and very little to criticize.

Many schools, of which the one with which I am connected (Tuft's) is one, do not give so large a place to Labaratory Technic as is evidently done by the one which the writer represents. To me it seems at least a question open for discussion, whether time spent in the infirmary, after a short laboratory course, does not in the end produce better results than the longer technic training.

It is our custom to confine the laboratory training to the first six months of the first year, after which with our large clinic, they have all they can do in the infirmary.

Dental anatomy is taught substantially as Dr. Webster has outlined with the exception that we have never tried any modelling in clay. Carving is confined to four specimens, Incisor, Cuspid, Bicuspid, and Molar. The student is furnished a natural tooth of each class and required to duplicate it as near as may be. The past three or four years we have used celluloid blocks for this work.

We have large wooden models (16 to 1), for teaching anatomy and cavity preparation; the idea of having them mounted in an articulated model appeals to me very strongly.

I shall certainly make an effort to obtain plaster teeth 5 to 1, to teach cavity preparation. This seems to me one of the most valuable points in the paper. It is very difficult for the average student to make in the small tooth forms, the cavities which have been shown him in the large models.

I notice that an engine is required by the writer even in the technic laboratory. If I should carry out my own idea on that subject I would allow no student to use an engine until he had entered his senior year. I believe the training he would get from the enforced use of an instrument, would be of much greater value to him than the time saved by the use of the engine.

As a whole the paper seems to me one to be heartily commended and I am very glad I have had the opportunity of reading and discussing it.

Dr. H. T. Smith,
Cincinnati.

In discussing Dr. Webster's excellent paper I should note the following points;—

The essayist recognizes the constantly widening range of Operative Technic proceedures, to keep the pace with the growth of Operative Dentistry. This fact, together with the increasing demands upon the student's time, made by the technic in other parts of our curriculum, necessitates the condensation (so to speak) of methods in some technic departments, notably that of dental Anatomy, which has been highly elaborated. Instead, therefore, of increasing the requirements in tooth modeling and tooth carving, we are disposed to reduce these, and give more time to tooth section cutting as prescribed by Black and Weeks. This we think, is superior technic work for the student in Dental Anatomy, as compared with modeling, for the following reasons:—

Firstly, the student is learning the microscopic structure of the dental tissues and their comparative densities and instrument feel.

Secondly, he learns the comparative occlusal contours of pulp, dentine, and enamel, which is important in cavity preparation.

Thirdly, he gets the correct sense of the proportions of these internal and external contours and thicknesses, which sense is apt to be distorted, by much work upon enlarged tooth forms, by either a student or practioner, noticeable especially in cavity preparation.

Fourthly, he becomes somewhat familiar with the variations in tooth forms in both crowns and roots, which variations are almost the rule in practice, and the typical forms the exception.

We recognize the difficulty in supplying sufficient numbers of extracted teeth (especially the anterior teeth), for each freshman student, but this can be done with the co-operation of the student, and without abusing the ethics of the extracting room.

I gather from the paper, that the technic in Dental Anatomy is presented to the freshman student and that his text-book is Black's Dental Anatomy. I know this is the accepted method, but when he says that "Dental Anatomy should include more than the teeth, it should include the arrangement, the articulation, and the occlusion of the teeth and the anatomy of the gums and jaws," the student will need something more than Black's Dental Anatomy; and I am inclined to think, that the association of Dental Anatomy will be more and more with that of Histology and Development, such as we have presented in Bromell's Dental Anatomy and Histology, and that we will not have time for an elaborate system of measurements of the external surfaces of typical teeth.

Be that as it may—nothing could be finer than the sequencial methods presented by the essayist in which carving follows modeling, then arrangement and articulation of the carved teeth, then cavity preparation in the same, and I presume the sequence is completed by filling the cavities so prepared.

The essayists' method of prophylaxis technic is excellent and is new to me, and I have hastened to use it in implanting teeth in dummy jaws.

The elaborate scheme of "dental practice" technic presented seems a little appalling, but upon inspection we find that most of the details are covered in a natural way, as the patient is ordinarily assigned to the student in infirmary practice. As to a discussion of fees between the student and the Infirmary patient, however, we have always maintained that it should be discouraged.

if not actually forbidden, and with us the student has no means of knowing, except by making special inquiry, what fee has been arranged with an infirmary patient.

Regarding the matter of making the lower classman assistants to the Seniors in the Clinics, I should hesitate to adopt it as a regular rule, and shall be glad to hear a further report from the essayist after the regulation has been in force for a year or so.

I should consider the large teaching model, containing twenty-eight removable teeth, fifteen times natural size, mentioned by the essayist as a most desirable piece of apparatus and hope to learn more of it, having despaired of securing a satisfactory model of this kind.

In default of such a model (but hardly as a substitute for it), I have just devised a Manikin head which I am glad to present at this meeting. The skull you will recognize as the Wright Manikin Head, made in Philadelphia. To this I have had adapted removable grooved jaws, made of bronze, in which can be arranged and articulated natural or carved teeth. The natural teeth, in the case before you, are implanted in rubber tubing, after the manner described by Dr. Webster. This head can be attached to the head-rest of a dental chair and the adjustments of a patients head as to height and position thus simulated. This manikin is intended for demonstrations by the teacher, and its various methods of application for teaching operative proceedures, will at once suggest themselves to you all, so that I need not describe it further.

Dr. Cattell, Nashville. Dr. Webster has so elaborated upon the the paper sent me for consideration and has made so many loop holes through which he may later crawl out that some of the things I state may not be exactly to the point, so remember I had nothing but the first part of the present paper, sent me a couple or three weeks ago, and my discussion is written out. I hope this explanation will suffice. The title of Dr. Webster's paper is very different from the one Chairman Byram mentioned in his letter to me asking for a discussion, that my scheme of proceedure had to be entirely reconstructed.

Instead of "A method of teaching" as was intimated in the communication, the title now appears as "subjects not previously presented."

The paper comes from a masterly hand—a born teacher—one ready to take up new ideas or change to others when experience shows the necessity—one who recognizes what was good teaching yesterday may not be the best method to-day. Broad mindedness and willingness to advance indicates the true teacher.

If I had read the paper without knowing how it was titled, I would have said it was a grand paper, EMPHASIZING many subjects PREVIOUSLY presented before this Institute, elaborated upon systemized and clothed in new language.

In the author's remark about "the necessity of knowing Dental Anatomy to practice Denistry"—I cannot entirely agree with him. He says a Surgeon may know little of Dental Anatomy as exemplified from a written examination, but much as exemplified from daily practice.

I take it that is not the Surgeon you or I care to place in trust of our limbs or lives. If he knows not the anatomy of the part to the minutest detail—the bones, muscles, blood vessels and nerves—yes, every landmark—fossae, cavity, tubercule, curvature, every divirging, converging, looping-passing bursa—dividing line between muscular and cartilaginous tissue, including of necessity the nomenclature belonging thereto. Can a man construct and teach without knowing the names of the different parts that go into the make-up of the whole? Would he be called by his fellow workmen "a watchmaker" if he knew not the nomenclature of the mechanism?

A geographer surely knows the names of the mountains, rivers, promentories, sounds, and other topographical points before he undertakes to make a map. How about the eye and ear surgeon? Have they a working knowledge only? Do they not need to know the anatomy as exemplified by every detail and minute variations? Can they know these things without familiarity with the names of them? I fear there are many dentists who have a working knowledge as the Doctor puts it, who can not differentiate between a deciduous and a permanent molar. The "land-marks" were never studied in minutia—every fossa, sulcus, groove, ridge, tubercule, was not named and spelled out till familiarity became a fact.

One whom we all delight to honor as a teacher has said, "He who knows the nomenclature of his profession, knows the subjects of it." I heartily agree with the author, in that the teaching of so called Dental Anatomy should include more than the teeth. He says "the arrangement, the articulation and the occlusion" I would rather say the general arrangement, alignment and occlusion.

The word "articulate or" "articulation", in anatomy, has only to do with joints more or less moveable, a word, by the way, that has crept into the nomenclature of prothesis, surely unadvisedly. There is nothing in the construction of an artifical denture, or crown that has to do with articulate joints, such as the attachment of the mandible to the temporal bone. The suggestion regarding comparative anatomy is excellent. While a few schools have a fairly good course relating to the teeth and jaws, many more should have. In the explanation of clay modeling, the author has gone over the ground thrashed out several years ago by Dr. Tom Weeks and others I remember one year our exhibit space was considerably taken up by clay work done by students. I have before me at this moment some specimens made in the University of Pennsylvania and the North Western University.

The University of Minnesota, Vanderbilt University and several other schools tried faithfully the clay modeling exercise. It was largely abandoned on account of the muddy benches, floors and clothes the freshmen boys left after the exercise. The teachers finding other ways to accomplish the results wanted.

The suggestion that students carry in their pockets set of extracted teeth for ready refference is excellent.

In the year 1890 and 1891 I had students gather together and assemble in their proper order sets of extracted teeth and stringing them on straight wires or on cords. Later Dr. Weeks had students assemble teeth on wire and then bend the wire into rings.—one ring carrying the upper and another the lower teeth. Later still, Dr. Arthur (of Pittsburgh) introduced a frame of wire, whereby the teeth could be so arranged as to have the occlusal surfaces of the lower teeth approxing those of the upper. This form he called a "Typodent". This was the ancester of the present celluloid forms attached to small "Anatomical occluding frames" put on the market by Lee Smith & Son of Pittsburgh.

The idea was that the student might have a set of teeth handy, ready for inspection and comparision at any time.

Dr Webster seems to favor vegetable ivory for carving reproductions of tooth forms. True, it cuts easily, too easy for perfect outlines. I mean too readily mared by a false move or slip of the carving instrument, but where carefully done the result looks well just so long as it is kept clean and dry. The care it takes to keep in proper condition makes it difficult for students to properly handle, while celluloid is almost as easily carved, not nearly so readily soiled and affected but very little by moisture, none for the work in hand. While ivory or good bone make the ideal when carved into tooth forms, it requires long hours, close attention and the cutting is apt to become tedious to the novice, but when done it stands for all time and withstands the knocks of much usage.

The suggestion of the use of skulls in the teaching of Dental Anatomy is one that there can not be too much said in its favor.

I have longed for sufficient number that all the class might inspect and follow the points referred to from the chair. At least one for every 3 students, but my collection falls short. There are no cuts or disarticulated bones and teeth that can be used to such great advantage as the skull intact.

The writer's method of assembling the carved teeth and arranging them into a dummy jaw with the aid of wax and replacing the wax with flexible rubber is surely a good one.

Several schools have been testing the method. The Chicago College of Dental Surgery, under Dr. Tenny's direction was doing some nice work a few years since, using the Bryan pressed vulcanite teeth instead of the carved ones.

A number of schools have used the Wenker Flexible Edentulous Jaws. In these the tooth sockets are so arranged as to grip the inserted roots of teeth, be they carved ivory, celluloid or natural ones. The Wenker form simulated only the superior Jaw.

I like the idea of the arrangement hinted at in the paper better. There the two jaws with teeth in alignment the proper occlusion can be obtained, the two held in proper relation by a Berwell or Gritman "Anatomical Occluding Frame".

I have never instituted this form of Manual in my class work, more for lack of opportunity, than belief in the method. But Dr. Webster makes the advantages so plausible that I am convinced it is up to me to introduce it in Vanderbilt.

The teaching tooth models enlarged 15 diameters, spoken of, are surely of great advantage. The first enlarged models of jaws and teeth exhibited before the Institute, were wooden forms shown by Dr. Thomas Fillebrowne, of Harvard University.

Later, Dr. Weeks showed some beautiful tooth forms enlarged 15 diameters and others 30 diameters made of papier mache. The former were used in the study of Dental Anatomy and the later had cavities arranged in them with the walls colored different from the tooth surfaces, so the outline and walls could be easily seen from the farthest seat in the lecture hall.

The year following the Edentulous papier mache jaws were exhibited, with teeth diameters enlarged that could be inserted or removed as required. Some of the teeth having prepared cavities and others with the cavities filled with some composition to represent gold. The whole form set upon a pedestal and attached with ball and socket joint so as to turn at any angle desired before the class.

Much might be said of these enlarged models carried before the class. I can only emphasize what the writer says of their value.

About the time of the World's Fair in Chicago, Dr. Tom Weeks brought before this institute a lot of plaster tooth forms that his freshmen students of the University of Minnesota, had cast under his direction, they were enlarged some 3 to 5 diameters.

The students used them in the first part of their work in cavity preparation. Blocking out the cavity with any tool, with which they were familiar, usually a pocket knife. Forms of retention and resistance could be the more readily carved and understood, when worked in these than in the normal sized tooth. When somewhat familiar with ideal cavity forms as exhibited on these models the students were allowed to perform on the natural sized tooth forms.

As Dr. Weeks presented to me many of these castings, I prepared in them cavities patterned after such forms as we make in the mouth. They are in the Operatory as models to be copied in practical operations by students.

Later, Dr. Geo. H. Cushing, then of the North Western University and myself had some enlarged Excavators made of brass in sizes corresponding to tooth forms. The instruments were measured and shaped a la Black. These were used in demonstrations from the platform. More to show what instruments should be used in cutting out certain portions of the cavity. Showing instrument grasps, rests, etc.

Since, Dr. Black and others have had cutting and other instruments made of wood or aluminum in enlarged diameters corresponding in size to the larger papier mache forms.

The Laboratory Technic of Prophylaxis is surely a good one; better perhaps than that given by Dr. G. V. I. Brown, then of the Milwaukee School, several years ago.

Dr. Brown inserted teeth whose roots were more or less covered with calculus into the sockets of the Wenker flexible rubber jaws, then placing the rubber dam with holes cut rather widely apart over the teeth to be operated upon. The scaling instrument was pushed down between rubber dam and soft yielding walls of the flexible dumy jaw and then worked to remove the deposits. It seems to me that Dr. Webster's plan would "go one better" if the rubber dam was applied. It was proven long ago that a Rubber Dam Technic was and is very valuable.

My course has been to take the class to the Operatory shortly before they begin practical operations there and divide the students into pairs. One of the pair acting as patient and the other as operator, alternating from time to time.

First comes the Chair Technic.

Studying the different moveable parts and adapting the chair to the patient and so arranging the position of patient and chair to meet the requirements.

Second, the Rubber Dam Technic. Position, number and size of holes for given cases. The best way of determining the position of the holes so the dam will rest over the mouth to best advantage grasps in placing over teeth. Use of floss silk in assisting, ligating with or without brads and use of clamps to hold dam in place.

Third, use of cotton rolls, wads and napkins to dam back moisture.

Fourth, Engine Technic Positions while running and manner of applying force if it be a "Foot Engine". Study of the hand piece and its care, Grasps when in use . Closing the OPERATIVE TECHNIC COURSE with practical exercises in prophylaxes, thereby insuring a clean set of teeth in each students mouth as he enters the PRACTICAL OPERATIVE DEPARTMENT.

The suggestion made regarding under classmen becoming assistants to only such seniors "whose example might be followed", sounds well. But my experience of student conceit and prejudice would lead me to be very weary of such selected proceedure.

Certainly under classmen should be encouraged to watch and assist senior operators as occasion presents.

The features spoken of in the last paragraph of the paper, proposing that one man only should have generalship and close direction of all the Operative proceedures from the beginning of freshman life to end of senior course is ideal. When all rules of proceedure eminate from one head. Every quiz master, demonstrator and clinical instructor works in unision with the master head. Of course this view of it presupposes the "Master director" has gumption and good horse sense.

In reading Dr. Webster's paper over again, I like it the better. It is a collection of good things gotten together in systematic order by a busy man with a busy mind. I wish there were more of his kind. I thank you.

Dr. H. M. Semans, Columbus, O.

Doctor Webster has touched upon a point in the teaching of Dentistry that is of great importance, and that is, to impart a knowledge of the outlines of an object in a seeing and feeling way rather than by name only. When we leave the Public Schools, we know the names and the situation of all the important points that go to make up the geographical survey of our world, but until we have had a seeing and feeling knowledge of the same, the Cities are round dots, the Lakes splashes of blue, the Rivers, irregular black lines and the Mountains like rail-fences, and without then an actual contact on our part with these many parts we soon forget our lessons and at best our geographical knowledge is very hazy. I remember that a summer's trip throughout the East, when I was a youngster of 12, fixed some of the actual points of geographical interests in my mind so that my old geography text book was thereafter a constant delight to me.

The plan of work as explained by Doctor Webster is very comprehensive and in the essential is not different from our own work and for that matter the work in most of our Dental Colleges. There are a variety of methods, however, governed by the peculiar demands of each School. The student must be kept busy and a lack of clinical work will be made up by technic work. We have past the day of no technic training, I believe in every college. We differ, however, in time spent on this or that branch of work, and we differ, as is constantly illustrated by our exhibits, in methods in the detail. It is hard to criticise, nor can one find fault, in fact, with this plan of work laid before us. It is theirs, planned by them to meet their peculiar needs. As I have said before, there is a similarity in this scheme of work from the Toronto College with ours in Columbus. We have found that a soap, called "Easy Task" makes an excellent working material. It cuts easily and it keeps very well. Cavities in operative and porcelain technic are afterwards prepared in them. These models are five times the natural size. Then we spent a considerable time in drawing. Drawing each tooth as a whole, then its surfaces.

I teach Dental Anatomy, myself, as well as operative and Clinical Dentistry, and although the technical work is assigned to others, I never miss a trip every few days, in observance of the technical sections. Thus, I have each student under guidance from entrance day to graduation.

We use the natural teeth a great deal throughout all our technical courses. In the Senior year, I hand out a natural tooth to a student to be described. He describes its defects, the worn places, cavities, etc. I obtained from him a knowledge of its general make-up and a diagnosis of what the trouble was that probably caused its removal, and his idea of how it might have been saved.

Right here I would like to describe one way we have of teaching our students to observe as they go along. Our Juniors, go into the Infirmaries after Christmas holidays and spend considerable time on minor operations for patients. Then in a few weeks we have each one write a description of some procedure in his work on a patient,—a description of a case in fact. These papers are taken and freely commended upon by the teacher. The right and wrong use of scientific terms is brought to the class' attention. The phraseology criticised, etc. Often the papers will be critically examined by the students themselves. This work we also keep up throughout the Senior year. It is a pleasure to note the improvement manifested by all in both their powers of observance and their descriptive ability.

Dr. Walls,
St. Paul.

The announcement of a paper on this subject, to be presented by Dr. Webster made me hopeful of a pleasant reward in attending this session, and I have not been disappointed. In general, the lines laid down by the essayist have been followed rather closely by many of us. Some new ideas have been offered, and the subject as a whole set forth in a clear and systematic way. Much more might have been said, but the ommissions probably arose from a desire for brevity in presenting the subject.

There are some points that I should like to enlarge upon and emphasize.

First: In respect to models for operative technic work. The teeth should be so arranged that same irregularities will be established, showing the necessity for changes of operative procedure under abnormal conditions.

Another point is the materials in which these teeth should be mounted. Different methods have been suggested this morning for the mounting of teeth for operative technic work. The one great essential, it seems to me, is the use of substances that will hold the teeth in absolute contact with each other and yet will be pliable enough, when force is exerted on the teeth, to permit of their separation.

In this way the student will be required in the handling of cavities that involve a proximal surface to separate the teeth in making and polishing fillings, and establish perfect contour and contact for the completed operation.

As teachers you have all noticed the tendency of students to follow a routine in work, disregarding principles. They will almost invariably follow the anatomical lines of the teeth, without respect to any change of position of the teeth that might occur. Referring to the first point again, and taking for example a bicuspid that has been rotated twenty centigrades: The cavity preparation will most frequently be the same as though the tooth were in normal position.

One failure properly pointed out will teach more than a dozen successes.

One of the discussors seemed to feel that too much time was being devoted to operative technics.

I have proved to my own satisfaction, and I think to all of our faculty, the benefits of a thorough technic course, thereby placing the student in the best condition to take up work in the infirmary. They grasp the detail of the work better in technic than in infirmary work, and it is much easier to supervise in the technic room than in the infirmary.

The essayist refers to one method of teaching that seems to me an erroneous usage in instructing. It is in reference to the furnishing of models for the students to follow in doing their work. While this I believe to be commendatory in the preparation of the first cavity of each class of cavities, it would not commend itself for use thereafter. What we want is to teach the student principles, not methods.

Give them the models at first if you please, that they may follow the ideas set forth in lecture, then take the models from them and make them self-reliant. Teach them to think, to use their ingenuity, and work out the principles that we have been trying to instill into their minds.

The method of handling patients before students that Dr. Webster referred to in his remarks is one that he should be congratulated upon. We do not go into diagnosis and prognosis enough. It is a subject that should receive greater consideration in colleges and in office practices. The failure of good work from lack of due consideration of the strain upon it and the necessity of other requirements is too frequently met with.

Dr. J. Q. Byram, Indianapolis. There is one point Dr. Webster made that is a serious point to me. Since the advent of the porcelain inlay and since it is necessary for us to teach the same in operative dentistry, it is really a serious question with me just how much and where to place this work. The serious part of it is, that if we are not careful we may give our inlay work at the expense of the old-fashioned work, if you please to term it that, which develops dexterity. I contend that the best place for such work is in the senior year. I want to develop all the skill that it is possible to develop in the first and second years. I believe that all freshman work, all operative technic work in the freshman year, should be done with hand instruments; but I believe the engine should be used at the beginning of the junior year, and that the engine technic should come as a part of the technic course. I also believe that the hand instruments should be used at this time. There is a tendency, if the teacher is enthusiastic over some of these especial forms, for the student to believe that it is easy to do these things, and he is as anxious to get at these special operations and is liable to slight some of the older and better methods, so I believe that with our present three years' course we should crowd as much of the gold foil work in the junior year as it is possible to crowd in that year and develop the skill, then leave the special operations, such as gold and porcelain inlays for the senior year.

During the last semester of the senior year, our seniors are taken consecutively as examiner of patients. The patient is placed in the chair, the senior takes our records, makes the examination, then the examiner in charge O. K.'s it. We find this to be very successful. It teaches the student to observe closely. The examiner discusses these conditions with the student, and it is doing a great deal of good.

With reference to marking the work, Dr. Webster mentioned that I believe. Our seniors work to within one week of graduation. I believe it is a mistake to stop seniors at the middle of February or March; let them work on and put in time in the college until it closses. Ten, fifteen or twenty additional gold fillings will not hurt them. We work on a percentage, basis, and strike an average two weeks before graduation, and we never have the same requirements two years in succession. Every demonstrator keeps a pocket memorandum, and grades upon three different forms: First, upon the amount of work done; second, on the quality of work done; and third, upon the student's conduct in the infirmary. At the end of the year the demonstrators meet, when they have marked each student as they believe best, and then we take an average of each marking.

Dr. W. L. Fickes, Pittsburg, Pa. In the past dental caries seems to have received most of the attention of our profession—of the teachers, as well as of the laity—but it seems to me that the time has arrived when oral hygiene should receive as much, if not more attention than caries. I am pleased to see that we are making considerable advance in knowledge and skill in the treatment of pyorrhea alveolaris, and of the conditions which precede that disease. It has been said that after thirty years of age fifty per cent of the teeth lost are lost from pyorrhea alveolaris. There is no condition found in the oral cavity more difficult to treat, or that is more prevalent, and for this reason we should give it considerably more attention.

Dr. Ellison Hillyer, New York, N. Y. I may be slightly out of order in the discussion of the paper, but as Dr. Webster has put across opposite the preparation of cavities, there has been a great deal brought to my attention, and it seems rather opportune that it should be brought up right here. I have passed through the various stages of Master of Exhibits, etc., and I know full well what it means from year to year to bring exhibits to the different places, and I know what I have done. I have tried to take the best that I could from the viewing of them myself. Then there are other departments, of course, from which we simply have a report, and we let them do as they see fit. Again, I think these exhibits should be more a part of our discussion in this room, bearing upon the papers. Now then, we are not coming here just to be polite to each other; we all love each other, and I cannot see why we are not getting as many exhibits as we used to have. I do not think it is because men are getting tired of bringing them, but because they simply feel that we have not the interest in them that we should take and do not take the time to look at them and gather the points.

I am going to stop the discussion of this paper *per se*, but I wanted to bring this to your attention.

In speaking of Dr. Webster's paper, I want to say that I thoroughly agree with him in what he said regarding feeling and seeing; that is, to impress facts upon them as you would in the kindergarten, and he lays particular stress upon the feeling part. However, I do not know as it is any greater than the seeing or thinking. Take for illustration: Last night I saw a most prodigious and beautiful array at the banquet; to-day I am feeling it, and in looking around this room I see there are others in this same condition who will not soon forget. I do not know whether the feeling is greater or not. Dr. Webster says it is.

I would like to ask the Doctor if it is customary to ask the patients, or whether we are to instruct the student to ask them whether they are prepared to pay a part of the fee, and whether the students are instructed to ask this question when they get out into general practice.

He uses strips of various kinds for the carving of teeth. We use no strips, but use celluloid blocks. However, objection has been raised to celluloid in several instances because it will not carve. If you use a knife with celluloid it will often peel off, and tend to follow the grain, and your carving is imperfect. To overcome that we use a file. The effect is just the same, except that a file is used instead of a knife or engine. In the junior year, we think, is the proper time to permit the student to use the engine. In the first year he is not permitted to bring the engine into the infirmary. I would like to have information as to just when the junior class should begin to manipulate gold, and whether you use hand pressure, automatic mallet or hand mallet. I simply ask this for information, in case it is not touched upon elsewhere.

Dr. Gethro,
Chicago, Ill.

I was unavoidably detained a little while last night, but I am trying to stick to the text. In the first place, we do not use clay, plaster or any other of those softer materials in our teaching of Dental Anatomy, because we find that they do not get as much value out of the softer materials as we do out of the materials that approach as closely as possible the natural tooth. We use the ivory blocks, and we use them successfully. That plaster carves up nicely and that Dental Anatomy is better taught in conjunction with carving, we disagree with Dr. Webster on that point; and when we are carving a central incisor, we have nothing to do with any other tooth; we are studying that tooth, and at the same time we are making the carving of it. The objection I have to vegetable ivory is that it cuts too easily. I want the student to get technical skill; I want him to train his fingers, and he will not get that technical training with plaster, soap, etc., and he will not get it with vegetable ivory as well as he will with the ivory itself, therefore we do not use these materials in our teaching of Dental Anatomy. A student will get a good deal out of these materials, but I want him to get the most that it is possible for him to get. We have tried different materials, but I believe we get more good out of the ivory blocks than out of the softer materials, and in that way the student is taught instrumentation right away. He is also taught to care for his instruments. There is a question I would like to ask Dr. Webster. He speaks about the metric rule. We use the metric system in all of our work. One of the first things we do is to study that system in a general way. We make all of our measurements in that system, and have everything absolutely to form. Dr. Hillyer had no reference to me when he made that remark. You will notice in some of the carvings in plaster that some of the cavities are not made white, nothing to show the width of the enamel. There is the point where the student is led away. If he must use these materials, must have something very accurate, and these materials do not give that to him.

In speaking of the scales, we have quite a collection of them—not enough for every student, but we have quite a number—and any student can go into the laboratory and use the scales. All he has to do is to sign his name, and he is responsible for the scales. We have enough to provide for every class.

Another thing in teaching Dental Anatomy. The first thing I always require is a note book. I think a note book should be required in every case. We are now inaugurating a new system. We have an interchangeable leaf, and the student can bring one book in the morning, takes his notes on every subject, and at night he can take the leaves out and put them in the other books, therefore his notes are in consecutive order, and just as they were given to him. Everything is given him there, given him in lectures or quizzes, so that in everything of importance I insist that he make a record, and at some future time he cannot say that he did not know about it, or never heard of it, or something of that kind. I also have them make many drawings; I have them make drawings on the board, and have them copy these in their note books. These note books are taken up, and are graded on the drawings, etc. We have the enlarged models of instruments, enlarged fifteen diameters, and they are light and easy to handle. We teach the student to measure accurately one-tenth of millimeter, which is, of course, 1-250 part of an inch.

I made a number of notations, but I know I am beyond my time now.

Dr. Gallie, Chicago, Ill. Dr. Webster has crossed out on the board some notes to draw attention to what he said upon the question of inlays. The question of inlays is going to cause good many of us to think and to teach our students to think, in order to find where we should use inlays and how the cavities should be prepared. The student learns early how to prepare the cavities for gold foil, and I believe we should start earlier with the student on the subject of inlays, and teach him judgment as to what kind of a tooth or cavity should contain gold foil, and what kind of a cavity should contain an inlay. We should impress upon him the necessity for conservativeness and judgment. My idea is that we should teach our students judgment, because judgment is constantly demanded and is constantly guiding the fingers. This is especially applicable to the inlay.

We must also teach our students more about oral prophylaxis than we are doing.

Dr. Webster has a splendid idea in placing the teeth in rubber, not only because it is convenient to manipulate, but also because it gives the student ideas of results.

I think that in many cases the roots are scraped or scaled too heroically and too frequently, many overdoing it, with the result that the membrane and the soft tissues are so injured that a close attachment is impossible. This work must be guided by horse sense and judgment.

The paper is an excellent one. I want a copy of it. I want our students to read it.

Dr. H. E. Friesell, Pittsburg, Pa. Out of sympathy for the stenographer after Dr. Gallie has gotten through with him, I shall endeavor to speak a little slower.

As a teacher, I think we should only teach one thing at a time, and practice that one thing until the student becomes familiar with the principles and the details of that one thing; then he can put that out of his mind temporarily, take up something else and learn it thoroughly. It has been my experience where I have tried to crowd too many things upon students that a marked confusion of ideas results and the different things are not clearly understood.

We are unable to practice a number of these excellent ideas that have been given to us by Dr. Webster and some of the other gentlemen, for lack of time, and a sufficient number of assistants, and not because we don't realize the full value to be gained thereby.

Along the line of what Dr. Hillyer said, I want to say a word or two. The paper that Dr. Webster gives us is on one of the most important subjects that we have—the foundation of dentistry—and he gives us an excellent method of teaching Operative Dentistry from start to finish. In a discussion of the President's paper yesterday, I alluded to the fact that we are only beginning to teach our teachers, and two or three years ago I conceived the idea that it would be wise, in order to better teach our students Operative Dentistry, that we teachers should teach ourselves Operative Dentistry; and, acting upon this thought I sent a number of forms of plaster teeth to different prominent operators of the country, asking them to prepare cavities as they were teaching their students and have them exhibited here during the meeting. As yet I have not gotten them back.

I think that this is a vital point for this institute to take up, in order that we teachers may learn how to teach. You can not take up the whole of Operative Dentistry, but take one or two of the classes of gold fillings, and have Dr. Black, Dr. Johnson, and all of our men who are working along that line, come to our meetings with such exhibits and discussions, and you will have plenty of interesting matter to consider and much to learn.

Dr. Brophy,
Chicago, Ill.

Unfortunately I was not here when the paper was read, but I have gathered from the remarks that have been made and from what I see on the board, a great deal of its substance. The author of the paper has been for a number of years engaged in studying how to teach; he has pointed out to members of this Institute on other occasions facts in teaching which he has gotten from his examination into the methods which have generally been employed, consequently we would naturally expect that he would present a paper that would be a masterpiece along the line of teaching, as has certainly been done. The keynote of the whole situation, it seems to me, was struck by Professor Gallie, when he declared in his emphatic way that the most important of all things is to teach young men how to use judgment. One of the difficulties in the subject that the essayist has presented is that we do not get in these models typical cases of tooth destruction, especially the most extensive forms. I have never seen on exhibition in this Association models of teeth showing the most extensive cases of tooth destruction, which have been cared for and treated as the writer of this paper pointed out. We haven't them here now; we have, it is true, some cases of caries for the operative dentist to care for, but what we want is the most extensive cases. The essayist appears to teach Operative Dentistry in a systematic way, and, so far as I have been able to learn from his teaching, the nearer we are able to approach what he has pointed out, the better it will be for the students. The students are ready to accept anything from the teachers, so if the teachers are able to offer to the students in a condensed way and in a manner to teach them judgment, how to discriminate, and to determine when to shape a cavity for an inlay and when to shape a cavity for a filling, and what to fill it with, when an inlay should be put in, and when it is not wise to put one in, and how to take care of their patients, they are always ready to receive it, and if there is anything more important than this, I do not know what it is. The purpose of this Association is to teach men how to take care of their patients in the best way. If we depart from that we are not fulfilling our mission. I do not want to go outside of the discussion, Mr. President, but I do think that we have been weak in our exhibits. I have always thought so, so much that some of my associates said: "What is the use in taking exhibits; they are always the same;" I think the members of the Association are a little tired of that. What we want to-day is to systematize our work.

Dr. Webster,
Toronto, Can.

I do not like to take up the time discussing all of the points that have been made, but, in the first place, Dr. Cattell discussed the title of my paper right through. I omitted the personal points in teaching; details were incidental only. I do not claim that these models are my own or anything of the kind, but the whole principle of how to lay the subject before you was what I had in mind.

I would like to answer a question in regard to vegetable ivory which received a part in the discussion in relation to the ordinary celluloid. I think I have the distinction of introducing celluloid as a model, and I quit it four years ago. Why? It did not exhibit the proper qualities. In the first place, it carves easily. It is true you can make a nice tooth from it, but it will not polish very well, and that is about as far as it will go. You can not very well put it into a flask; you cannot cut it with a bur, and it will not give you a sharp edge, and it does not give you the proper colors from which to select a tooth. I dare say that some of you did not know that there are crowns of vegetable ivory on these teeth, the colors are so assimilated. Vegetable ivory is not soft; it is as hard as any material ought to be for the purpose.

Natural teeth are too friable for technique purposes.

Dr. Walls spoke of the advantage of using a model where the teeth are lapped, to show the relation that the teeth bear to each other. We have a model of that kind in fifteen diameters, which is the proper diameter. Those teeth can be seperated, and they will come back into place and into their proper relation. You can examine the fillings made by the students and see if the contact points are right; see if the proper extensions have been made.

Professor Brophy spoke of the teaching of judgment. Before any person can have a judgment on a subject, he must have the necessary number of facts upon which to build the judgment. We know through the study of Pedagogy and Psychology that children do not have judgment until at least eight years of age, and some children do not have the power of judgment until fifteen or sixteen years of age. It is impossible to teach judgment, it must be developed from facts in mind. We must teach them the facts first. Our schools should have a paper in their final examination, or a course in the senior year, upon the practice of Dentistry, which should be confined to a test of the young man's judgment.

I wish to thank the gentlemen for their complimentary remarks on this paper. I do not want anybody to think that I lay claim to originality in connection with a great deal of the work presented to you, and I want you to understand that I am presenting a subject in teaching, not exactly the details of what should be done.

TEACHING OPERATIVE DENTISTRY AND DENTAL PATHOLOGY.

BY H. B. TILESTON, D.D.S., LOUISVILLE, KY.

ASSOCIATION OF SUBJECTS TAUGHT.

In institutions of learning having large and varied curricula, as is the case in Dental Colleges, it becomes necessary, in order to avoid the employment of too many teachers, to combine two or more subjects in a professorship or chair. When such combinations are made they should rationally comprise those subjects that are naturally related to each other in theory or practice, as for example:

Pathology and Therapeutics.
Materia Medica and Pharmacology.
Bacteriology and General Pathology.
Chemistry and Metallurgy.
Prosthetic Dentistry and Crown and Bridge Work.
Operative Dentistry and Dental Pathology, etc.

These combinations fall into association with each other quite naturally. A glance over the faculty lists in the dental college announcements, with the subjects taught by each member, reveals a great variety of combinations, many of them quite incongruous.

It occurs to me that it might not be a bad idea for this body to suggest an arrangement of a curriculum comprising the subjects generally included in the curricula of all the colleges, grouping such together as are naturally related to each other, and to make an effort to bring about a uniformity in the titles of chairs in the colleges of the National Association of Dental Faculties.

In an examination of the announcements of 38 out of the 42 colleges members of the N. A. D. F. in 1906, I find the chair of Operative Dentistry variously entitled as follows:

Operative Dentistry........................	13
Operative and Clinical Dentistry...	3
Operative Dentistry and Dental Histology.....	1
Dental Surgery and Operative Dentistry.......	1
Operative Dentistry and Ceramics......	1
Operative Dentistry, Oral Hygiene, Dental Pathology and Therapeutics.....	1

Operative and Prosthetic Dentistry, and Orthodontia	1
Operative Dentistry and Dental Hygiene	1
Operative Dentistry and Dental Therapeutics	1
Professor of Clinical Dentistry	1
Operative Dentistry, Dental Science and Dental Technic	1
Operative Dentistry, Crown and Bridge Work	2
Clinical Dentistry and Special Pathology	1
Operative Dentistry and Operative Technic	3
Operative Dentistry and Dental Pathology	6
Operative Dentistry, Dental Pathology and Therapeutics, Crown and Bridge Work	1

The practice of operative dentistry cannot be seperated from an intimate association with dental pathology, nor can operative dentistry be intelligently presented to the student except as it is taught in conjunction with those pathological conditions of the dental tissues that operative procedures are designed to correct.

Hence it appears logical that operative dentistry and dental pathology should be taught together and by the same teacher. As Bain says, "There is a sequence growing out of the dependence of the subjects themselves." And there is quite enough material in these two subjects to occupy all the time usually allotted to each professor in the lecture schedule. The adding on of other subjects not at all allied to operative dentistry, such as orthodontia and crown and bridge work, as shown by some of the announcements, would seem to indicate either a remarkable versatility on the part of the teacher, or a paucity of teaching talent in some schools, making it necessary to load down the chairs rather heavily.

MEANS AND METHODS.

The teaching of operative dentistry and, in a measure at least, the therapeutics of dental pathological conditions, is begun in the technic laboratory. It is here that the principles underlying operative procedure are first enunciated and exercises are performed for the purpose of illustrating the technique of such procedures, familiarizing the student with instruments and instrumentation, and providing a course of manual training of inestimable value to the future operator. The course in the technic laboratory foreshadows the lecture course given later by the head of the department, and should agree with it in every particular, for which reason it is essential that the professor of operative dentistry and dental pathology should work in perfect harmony with the laboratory instructor; in fact, should dictate and supervise the technic course.

I have some times been disposed to question the utility of the didactic course following the thorough exposition and training in principles and practice as given in the technical laboratory. Of the two methods of teaching, the technic is pre-eminently of the greater value. As a lecturer, I am continually conscious of the fact that mine is a twice told tale. And yet, experience proves that there is ample justification for the lecture method. The lecturer is able to elucidate and perhaps illuminate the subject matter as taught in the technic laboratory. In the latter the instruction is inductive, by the former it is deductive. In speech the lecturer can bring forward one thing at a time, and facts and statements can be made to follow a serial order, and by fluent, yet clear and concise diction, a comprehensive view of the whole subject can be presented to the mind of the student.

Alexander Bain, in his work entitled, "Education as a Science," says that the three great functions of the Intellect are: Discrimination, or the consciousness of differences in things; Agreement, or the observation of points of similarity; and Retentiveness or Memory, the last being the most completely identified with the educative process. His argument relates of course to the education of the awakening intellects of children, while we as dental college teachers have to do with the specialized training of students whose minds are already, more or less, schooled in intellectual processes. But however advanced the preliminary education of an individual may be, when he enters upon the study of the art and science of dentistry, he becomes as a little child, for all things are new to him, and the principles of education that are applicable to a child apply to his education also.

In the technic course he is taught to note the differences and the points of agreement in things and processes, and by the doing of them they are impressed upon his memory. The lecturer repeats many of these things from the platform, presenting them in a different way, and they appear more interesting to the student for the very reason that he already knows something about the subject of the lecture, and still a deeper impression is made upon his memory. Few students are capable of grasping and retaining instruction which is presented to them but once. It is only by iteration and reiteration of facts and deductions from facts, which are principles, in laboratory, lecture, and quiz, .that the mind of the average student can be brought to actually acquire knowledge. Even after the most careful and painstaking efforts on the part of both demonstrators and lecturer, the final results are frequently disappointing. Education may be said to be the accumulation of things remembered. To most intellects frequent repetition is essential to the fixing of lasting impressions upon the memory, and hence the lecturer, even tho he but repeats what the student has heard before, is not by any means without utility in the educative scheme in vogue in dental colleges. And moreover, the lecture method adds dignity to the course and saves the dental college system of education from the accusation of being a mere mechanical training, accomplished wholly in laboratories.

Not only should the head of the operative department be in close touch with the technic laboratory instruction, but he should also supervise the work being done in the operatory clinic. The demonstrators should be under his direction, and he should see that the teaching at the chairs agrees with that given the students in his lectures. He should visit the clinic at least once a week and spend several hours inspecting the operations of the students, helping and encouraging them to develop the highest order of excellence in their work. It thus appears that there are three stages in the teaching of operative dentistry: The technic laboratory, the lecture, and the practical clinic, all of wihch must agree in every particular, and must essentially be under the direction of the head of the department.

TEXT BOOKS.

The absence of a real satisfactory text book on the subject of operative dentistry upon which to base a course of lectures, has doubtless been as keenly felt by other teachers of this branch as by myself. The American Text Book of Operative Dentistry has many excellent chapters in it by good writers and teachers, but by reason of the fact that it is written by many individuals, it lacks continuity and sometimes, consistency. There is the notable absence of a chapter on Dental Caries or any reference to this disease, which is so closely identified with operative procedures upon the natural teeth, while quite as notable is the presence of chapters having no rational connection with operative dentistry whatever.

Marshall's Principles and Practice of Operative Dentistry, is in some respects a better text book for students than the American Text Book. It is more connected in its treatment of the subject, but is rather too prolix and not elementary enough for college use, being designed by the author as much for a reference book for practitioners as for students. It has some excellent chapters on dental caries.

On Dental Pathology and Therapeutics the Burchard- Inglis work is quite satisfactory for student's use, with the chapters in the American TextBook, Marshall, McWhinney, and some others, for collateral reading.

For my own purposes I have derived the greatest satisfaction from the writings of Dr. G. V. Black, whose methods of teaching are more elementary, scientific, and systematic, and better adapted to the needs of students than any other I know of. Unfortunately he has not, as yet, arranged his works in a single volume that can be used as a text book, although I understand he has one about ready to be issued.

Text books of course, are primarily for students' use. A course of lectures on Operative Dentistry should not consist of recitations from any text book. While following the orderly arrangements of topic of an acceptable text book, if such a one may be had, lectures should be enriched by excerpts from other works, from pertinent magizines article presenting the latest scientific truths, and by the relation, now and then, of personal experience and investigation. There is nothing so fascinating to the student as the relation of the results of personal experiments and original investigations. It is unfortunate that we teachers are not all originals. It is the privilege of most of us only to set forth the truths that have been revealed for us by others who are specially endowed with the rare faculty for scientific research. It is a precious favor indeed to be permitted to sit at the feet of a Miller, a Black, or a Broomell, and imbibe knowledge at first hand from the masters.

My idea of a text book, and likewise of a course of lectures, is that they should tell a story, beginning as a story does, with the introduction of characters or thing with which the student is to become better acquainted as the relation proceeds, and increasing in interest with each succeeding chapter or lecture, the orderly development of the plot or scheme holding the attention of the student until the final denouement completes the narrative to the satisfaction of both author and reader or lecturer and students.

A LECTURE SCHEME.

In arranging a course of lectures on Operative Dentistry and Dental Pathology, I endeavor to follow an orderly sequence of topics, introducing first those subjects which help to a better comprehention of what is to follow, and developing the scheme from day to day until the story is complete. I deliver two lectures a week, on Tuesdays and Fridays, at 8 A. M., with some extra hours for review quizzes. No two teachers would likely agree fully in their ideas as to what topics should properly be included in such a course, nor as to the order in which they should be introduced. The discussion will doubtless bring out other suggestions. Mine as follows:

FIRST SEMESTER.

Histology of the tooth tissues, the pulp and peridental membrane, one hour.

(Simply a rapid review for the purpose of renewing a vivid picture in the student mind of the structure of the tissues so closely involved in our future study).

Affections and diseases of the hard dental tissues other than caries, one hour.

Caries—history, etiology, (the two classes of causes), treatment, etc., six hours.

The operator, personal hygiene, posture and bearing, hand rests, grasps and guards, etc., one hour.

Cleansing teeth preparatory to furthur operations, etc., one hour.

Demonstration before classes of hand rests, grasps and guards, adjustments of rubber dam, and other means of controlling moisture, using a student as subject, two hours.

Hypersensitive dentin, two hours.

Instrument nomenclature, one hour.

Cavity nomenclature, one hour.

Cavity preparation, principles and rules, etc., three hours..

Cavity preparation by classes, using large models, ten hours.

Review preparatory to mid-term examinations, four hours.

Mid-term examinations, about January 17-20 end of first semester.

SECOND SEMESTER.

Filling materials, points bearing upon selection of, essential properties of, etc, one hour.

Gold—properties of and forms of, methods of preparation and principles of use in filling cavities, three hours.

Filling with gold by classes, including the employment of non-cohesive gold where indicated, finishing and polishing, seven hours.

Amalgam—history—formulae for alloys, physical properties of, Dr. Black's experiments and conclusions, two hours.

Methods of mixing or preparing amalgams, the matrix, instruments, variation in cavity preparation, packing, finishing, etc., one hour.

Other filling materials, properties and use of, two hours.

Details of porcelain and gold inlays are taught by a special chair.

DENTAL PATHOLOGY AND THERAPEUTICS.

The term "Dental Pathology" is meant to include the affections and diseases of the hard dental tissues—abrasion, erosion and caries, which are taken up at the beginning of the term when the treatment of these conditions is studied, and the diseases of the dental pulp, its death and putrescence, and the infection of the peridental membrane about the apical foramen resulting in alveolar abcess—and nothing further.

Outline of course is as follows:

Pathology and Therapeutics of the Pulp and of the Apical Peridental Membrane.

Diseases of the Dental Pulp.

Symptomatology of Pulp.

Constructive diseases, including tubular dentinification, deposits of secondary dentin, pulp nodules, calcific degeneration, etc.

Diagnosis, Prognosis and treatment of above.

Destructive diseases of pulp.

Hyperaemia, active and passive.

Congestion, Inflamation, Suppuration and Hypertrophy.

Etiology, diagnosis, morbid anatomy, prognosis and treatment of the foregoing conditions.

Pulp capping.

Destruction and extirpation of pulp by means of arsenic or pressure anaesthesia or infiltration.

Gangrene of pulp, dry and moist. Methods of opening into and treatment of.

Diseases of Pericementum.

Symptomatology of.

Acute Septic Apical Pericementitis or Alveolar Abcess

Etiology, stages of.

Prognosis and treatment.

Chronic septic purulent apical pericementitis.

Etiology, two forms of.

Diagnosis, prognosis and treatment.

Filling of root canals.

The foregoing, about fourteen hours.

Review quizzes previous to final examination, four to six hours.

Some time is given to consideration of the care of the deciduous teeth.

A part of each lecture hour, from ten to fifteen minutes before the lecture, is devoted to a quiz over the work of the previous hour.

The above schedule provides for something over seventy hours. The subject is a big one and cannot be adequately covered in much less time.

It has been my custom to deliver the lectures on dental pathology the last thing in the course. This term I shall alternate these lectures with those upon operative procedures, throughout the second semester, in order that the student may have the advantage of instruction in the treatment of cases they are meeting with in the clinic.

The above course is delivered to the senior and junior classes together, each student thus hearing the lectures twice. As I remarked before, even with this repetition and the review quizzes, the final results are not always satisfactory.

As an aid to the student in following up the lectures with further study, and for the use of the quiz master and the quiz sections organized by the students themselves, I have arranged and published a quiz book containing a large number of questions covering the various topics minutely, with an appendix giving answers to such questions as are starred and which are not found in their regular text-book. I have found this book to be a valuable help to the classes. It is not contemplated that it should take the place of text-books, as is stated in a disclaimer to that effect in the introduction, but rather that further research should be encouraged. Copies of quiz books exhibited herewith.

I have not attempted to get into details of clinical instruction in the infirmary, which comprises a very important part of teaching of operative dentistry and dental pathology, as that has been made the subject of other papers presented at previous meetings of this body.

Discussion.

Dr. D. M. Gallie,
Chicago.

It is a great pleasure and most instructive to have the opportunity of listening to a paper such as has been presented. The institute is to be congratulated on having among its members one so well qualified as the essayist to present a paper on this live topic.

I regret that I am unable to discuss this paper in its entirety, as I am not qualified to discuss the teaching of dental pathology. My time is given entirely to the subject of operative dentistry, didactic and clinical.

The coupling of the subjects, as given by Dr. Tileston is very good; there is a connecting link between them that brings them into the closest harmony and relationship to one another, and makes it possible for the lecturer to concentrate, and not divide, his fire, and his suggestion that an effort be made by this association to bring about a uniformity of teaching subjects is an excellent one, and I am sure would result in great benefit to both teachers and students. We would find it much easier to handle the students that may come to us from other schools. Not only should there be some uniformity of subjects taught; there should also be some uniformity of system as to when they should be taught. Were we to have some such general system, I believe our students going before different boards would find it beneficial, as I believe in time State Boards would adopt a similiar system, that is of having different members examine on subjects that are in a measure closely allied. Whether a teacher shall teach one or more subjects is a question of circumstances; personally I believe that one man has all he can do to teach operative dentistry, especially if he is in active practice, and I firmly believe that this subject should be taught by one in the harness. The ever-changing method of operative procedure and the everyday clinical experience is of inestimable value to both student and teacher. It is impossible for the teacher of operative dentistry to avoid talking on dental pathology, just as it is hard to avoid some talk on therapeutics. It is necessary, to clearly illustrate and explain operative procedure, that we in a measure begin other subjects. This is especially true when lecturing from infirmary observations. When the subjects are separated and handled by two different lecturers there should be some understanding between the chairs as to the lectures. The lecturer in dental pathology should give his lecture so that the student could have a clear understanding of the cause and repair of the conditions under consideration. Consequently, I believe, that the teaching of dental pathology should be taken up early in the course, and the change that Dr. Tileston contemplates, of changing his lectures on this subject so they will alternate with operative dentistry, is a good one, and I am sure will prove beneficial to the student. I do not believe that Dr. Tileston starts in soon enough with his lectures on dental pathology and therapeutics. Much good, I believe, comes from giving the freshmen along the last of the second semester, elementary lectures on this subject. It prepares them for infirmary work in the Junior year, and gives him something to study and investigate. We can not emphasize too strongly the necessity for perfect harmony and unity in all departments of operative dentistry. From the day the freshman enters the technic laboratory to the day of his commencement he should feel that the department is a machine, perfect in all its parts, working in unison and without friction. The head of the department should be the master mechanic, seeing that each part is doing its duty towards turning out a perfect product. The greatest care should be taken that our boys start right. If that is done, half the battle is fought.

The next important factor is the competent demonstrator—the man who will do as the chair advises and not persist in demonstrating some fad or folly of his own.

No man should be head of the department who does not spend at least one-half day a week in the infirmary. By so doing he is in close touch with the work of the demonstrators and is thoroughly familiar with the skill or shortcomings of the student. His presence in the infirmary every week, demonstrating, examining and passing on their work, acts as a great stimulus to the students, and makes it possible for the lecturer to present to the class their frailties; the faults of one usually are the faults of many, and even though it is a thrice told tale it hits the mark.

I find it absolutely necessary to separate, over and over again, parts of my work. Our practical work differs from other subjects. If I may be permitted to use the Missouri expression, operative dentistry is a "show me subject". You may talk a lecture as much as you like on cavity preparation and manipulation of filling materials; if the student is not able to make some application of your lecture, it is not likely to make a lasting or intelligent impression on him, so I find it necessary to give much of my course twice, but in different years and the classes separated.

There is such a thing as a lecturer appearing too often before his classes. The lecturer who starts in with a student in his freshman year and talks to him until he graduates has a hard task, and so has the student. He is apt to get tired of you, and while it is necessary to go over some of the work in all three years, I think it well to have the story told at least once by some one in perfect harmony with the head of the department.

As head of the department I start in with my lectures to the Juniors and lecture to them one hour a week. They have had their technic laboratory work, and their dental anatomy, they are familiar with the nomenclature of instruments and cavity. Like the essayist, I commence with a brief history of the tooth structure and their environment, following with their chair position, which is to me of great importance; position of operator, rules to be observed in caring for patient; care of instruments; personal appearance of operator, emphasizing the necessity of starting the practical work with some system and order; the proper handling of instruments is considered, followed by three or four lectures on the sealing and polishing of the teeth, treatment of the gums, ligation or fixation of loose teeth. We endeavor to teach oral prophylaxis in the most thorough manner. This is followed by examination and recording of carious conditions, separation of the teeth, adjusting of rubber dam, use of ligatures and clamps. This brings us up to the holidays.

We then start on the treatment of caries and cavity preparation and the proper restoration of tooth, much in the same manner as presented by the essayist. I find it a difficult work to lecture on cavity preparation and filling to the Juniors, as many do not get down to infirmary work until late in the session. This same class has two hours a week in the technic department, where the technic of the engine, instruments, rubber dam, clamp positions and instrument grasps, followed by cavity preparation and filling with all the materials, including inlays. The senior lectures are, in a measure a repetition, except that considerable time is taken up with infirmary observations. With my senior lectures I do not take up all the different classes of cavity preparation, and then follow by the different filling materials; instead I take up one class at a time, and start in with separation, preparation of cavity, filling of same by all the different methods, and the finishing of the work. In this way I believe it is more interesting to the class, and it is lecturing on exactly what they are doing. In this way, I find it brings out many questions from the class, that clears up many uncertain points. I then take up the next class, and handle it in the same way, involving all that is necessary in perfecting the operation.

The latter part of the year lectures are given on Ethics, location and filling of office, dental fees and what they should be governed by.

The question of text-books is one that gives us much concern. While I find very much that is excellent in Dr. Kirk's and Dr. Marshall's books, yet I can not use them to advantage as a text-book for the student. My experience has been that Dr. Johnson's book comes nearer what they need. I understand that before very long we will have a book that will cover all the work and details that we so much need, but one thing I am afraid of is that in a measure it will be prohibitory to a number of the students as it is to cost ten dollars. However, we must get it, make good use of it and recommend it and I am sure as many as can will get them.

We receive copies of the different dental journals and select the best articles, calling the attention of the class to them and request them to read such articles carefully. It keeps them in touch with the best in dental literature, and also stimulates a desire for magizine reading.

I have not seen Dr. Tileston's quiz book. If it is similar to the one Dr. Byram has presented it is a good one and I am sure is a great aid to the student. However, with the aid of different text-books, quiz books, best articles of the dental press and the presentation of our own ideas, we are compelled to devote a lot of time, which can not be spared, to the consideration of questions given by men on different state boards, who have not had a college course, and who give questions and expect answers entirely foreign to our ideas.

I hope this institute will perfect some system of teaching that can be adopted by the different schools of the country, then confer with the officers of the National Board of Examiners, and together we will be able to clarify the atmosphere, which at present is very clouded.

Dr. L. M. Waugh,
Buffalo, N. Y.

Dr. Tileston's able paper is presented mostly from a basis of operative dentistry. Two of the gentlemen who are to share in its discussion are teachers of the subject, and may be expected to direct their discussion from this angle. Therefore, we shall confine our argument mostly to the association of operative dentistry and dental pathology, touching only in general on a few other thoughts.

The suggestion seems commendable that the institute take up the matter of formulating a curriculum, so associating related subjects that the most effective teaching and a fairly equal distribution of the work of each chair would result. At first, it could be fully adopted by only a few colleges, but it would serve as a standard up to which all would naturally work and in a few years, it would result in a considerable improvement in the uniformity of the titles of chairs or professorships. The advantage of this is obvious.

We would here further suggest that this body might do valuable service in recommending the division of a faculty, so as to group correlated subjects into departments, or sections. The teachers of these subjects should have meetings for the purpose of arranging their several branches with reference to scope and sequence. By this means three essentials to best teaching would be attained; that is, preclusion of contradictory and confusing statements, avoidance of unnecessary repetition, and exact knowledge of what is taught by each member of the department.

The "means and methods" of teaching operative dentistry, as outlined in this paper, are almost identical with those of the University of Buffalo prior to three years ago. Since that time the work has been somewhat rearranged in the following respects. The course is graded, so that no two classes receive lectures together. The head of the department fully supervises the operative technic course, finally passing on all work of questionable merit. This takes about one hour per week. Much more time is devoted to the inspection of the infirmary clinic, the average being four hours each week. Inefficient work on the part of both student and demonstrator are alike discovered and corrected. Faults of the student are pointed out immediately, while those of the demonstrator are discussed in an inoffensive way at the weekly demonstrators' meeting. All are thereby benefitted and uniformity in demonstration is greatly enhanced. This consumes about one hour.

The lecture course consists each week in one hour to the Freshman, two hours to the Junior, and one hour to the Senior classes.

Formerly the technic laboratory work preceded the lectures, just as is recommended in the paper. After careful trial it was decided that a clearer comprehension by the student and a more lasting impression is made by first hearing the lecture, and while the knowledge gained is still fresh, conveying it to the finger tips in the laboratory work. The demonstrator while going about among the students does constant individual quizzing upon the lectures, elucidating obscure points.

The lectures to the Freshman class embrace the principles of cavity preparation, the characteristics, manipulation, indications and contra-indications of the filling materials and the cleansing and filling of pulp cavities.

In the Junior year two lectures a week are delivered and the course completely covered. It includes all of the operative dentistry outlined in the paper except what we have referred to as given in the Freshman course.

In the Senior year the one hour each week is devoted mostly to recitation work in review of the entire course, interspersed with special study of such parts of the subject as may be deemed necessary by the staff of demonstrators at their weekly meetings.

The association of "dental" pathology with operative dentistry is the part of the paper which we wish especially to consider. We agree that it is essential that the professors of operative dentistry and oral or special pathology must work in perfect harmony, but we beg leave to differ from the statement in the paper that the two subjects can best be taught by the same teacher. Our objection is for three principal reasons: 1.—We believe that a much better pathologic reasoning power is developed by teaching oral, or special pathology intact. 2.—To avoid loading down the chair of operative dentistry too heavily. 3.—By seperating "dental" pathology, oral pathology is robbed of much of its practical significance.

The head of the department of operative dentistry devotes ten hours plus, each week to the teaching and supervision of his branch. Add to this the irregularities in conduct of student, patient, and occasionally of demonstrator, the stocking of the supply room, etc., it seems fully as much as would be wise to expect of one man.

In expressing our belief that a much better reasoning power in matters pathologic, is developed by teaching oral pathology intact, I base my opinion partly upon results obtained by the two methods. Up to three years ago that part of oral pathology outlined as "dental" was taught by the professor of operative dentistry. In the last three years it has been included in the course of special pathology, and taught from a basis of minute structure—histology; and normal function—physiology; just as must be all pathology to be best and fully understood. The great essential, the power to reason, in considering dental pathologic conditions has been vastly improved.

To illustrate the saving of time in the didactic teaching of operative dentistry, we shall quote from the paper. In the "lecture scheme," first semester, one hour is devoted to a "rapid review of the histology of the tooth tissues, the pulp and peridental membrane for the purpose of renewing a vivid picture in the student mind of the structure of the tissues so closely involved in our future study."

It takes us approximately 24 hours in lecture, lantern exhibition, histologic laboratory and quiz to teach the histology outlined, yet in the paper only one single hour is given to a "renewing of a vivid picture in the student mind."

We heartily commend this general practical review of a correlated subject. Exact repetition, especially by teachers of different subjects, does not confuse; it greatly emphasizes. Why the paper should not advocate the same relation in connection with "dental" pathology, we are at a loss to understand. Thirty-one to thirty-three hours out of a total of seventy hours of the entire course as outlined, are given to "dental" pathology.

We are convinced that instead of spending so much time in teaching "dental" pathology, it would be much better to devote from two to four hours in "renewing a vivid picture in the student mind" of the disease changes and conditions which make necessary his operative procedures. Thirty hours, approximately, would thereby be saved the teacher of operative dentistry, and we believe a more lasting impression would be produced.

We are advocating the teaching of the two subjects seperately and by different professors; therefore, an outline of special pathology is not called for. We shall briefly illustrate the line of demarkation as we draw it. For all technical procedures the student is referred to the department of operative dentistry. For example, in considering Venous oı Passive Hyperemia of the Dental Pulp, we study the definiton, etiology—causes are two in number—pathology and morbid anatomy, symptoms and prognosis. The student is taught to reason from the foregoing and decide as to whether the organ had best be conserved or destroyed. Here the scope of pathology ends. The treatment is operative, therefore, is referred to that department.

It is not always easy to draw so sharp a line of separation, but as the two chairs belong to one section of the faculty, each teacher possesses exact knowledge as to the instruction of the other, and no serious overlapping or contradiction occurs.

The third reason for advocating the teaching of special or oral pathology intact is, the impressing of its practical significance. This constantly looms up to us as most important. There are so many practitioners—former college students—who are content to do nothing more than mechanical work in the mouth, stolidly ignoring disease conditions even of the peridental membranes, to say nothing of the gum septa and soft tissues of all parts of the oral cavity. By reason of having to apply their pathologic knowledge of the tooth structures almost constantly in the infirmary clinic, it serves to impress the practical importance of the whole subject, which, because of this, receives much more of their attention than were they to feel that the conditions studied under the head of special pathology were only occasionally met with in practice.

The crying need of dentistry seems to be an awakening to a "pathologic sense." In this, as in nearly all matters pertaining to eradicating existing evils in dental science, the college can best begin the work. If the institute through its members can bring about the awakening, it will surely be attaining to its ideal, that of improving dental education; and success in this implies the preparation of men and women capable of giving a higher class of professional service to the people.

Dr. Louis P. Hall,
Ann Arbor.

While it would no doubt be a desirable thing to unify the curricula of the various colleges I hardly see how it can be accomplished when we consider the different conditions, under which the schools or colleges are operated.

I suppose ours is not the only school whose teaching force is partly medical and partly dental.

For that reason it is quite impossible for all colleges to give the same courses in any given term or semester

It is on account of this that in our shcool; we hesitate to accept students from the other schools because the courses they have not had, have perhaps been completed by our students in the same grade and frequently especial arrangements have to be made for a few such students.

The suggestion of the essayist that certain branches might be or should be taught by the same chair, if such provision can be made, is a very good one. But the advantages of such an arrangement can and should be made use of by all teachers. Each course is so interwoven with some other one or two courses that the teacher, especially the lecturer, should avail himself of the many opportunities that come up wherein he can show the relationship between those various subjects. Such digressions help to fix the points in the students minds and make all courses much more interesting by showing the dependence of the one upon the other. For instance the teacher of Operative Dentistry will have frequent opportunity to refer to the course in Dental Anatomy, as will also the Prosthetic and Crown and Bridge instructors, and so it must necessarily be with all correlated courses.

Now if it is desirable that the teacher of Operative Dentistry teach anything else, the essayist is quite right in stating that Operative Dentistry, Pathology and Therapeutics are especially well adapted to go together. At Michigan these three subjects as outlined by the essayist are given by three different instructors and so much as relates to the principles underlying operative practice, such as the physical properties of filling materials is given by a fourth man—Dr. Ward in 34 lectures.

The Operative Technique is taught by lectures and laboratory work in the Junior year, and as soon as this course has been completed the juniors take up the clinical work in the operating room. With us this gives our second year men from six to eight weeks of clinical operating. This method works well for two reasons: Our clinic is usually excessive in the second semester and we are able consequently to select more simple cavities for the junior student to start on. Then too the seniors having become more proficient the demonstrator's time can be devoted to the new men. At the beginning of the next session all these men come in as seniors and begin their operative work with some experience.

Lectures in clinical Operative Dentistry are given the seniors at the beginning of each session just before taking up the clinical work of each day at one o'clock four or five days each week and occupy from thirty to sixty minutes until the technical and clinical features are fully presented.

Here the teachings of the technical laboratory are elaborated and their practical appreciation is enforced.

There is this difference in two courses. In the Technique course the student is carried through from the simplest to the more difficult work. Whereas in the actual clinic experience the student may start with what at first sight appears the simple cavity that he has been told to begin with, but many times such cavities will develop into quite complicated and difficult fillings or treatments, many other complications may also arise.

For this reason it has been difficult to know the best way to meet such emergencies and keep these lectures abreast of the work.

It has been my practice to digress whenever occasion warrants from the systematic or fixed course sufficiently to enable me to utilize every incident or instructive case that may develop in the clinic or elsewhere.

As to text books for reference I am greatly indebted to both Doctors Black and Johnson.

As the teacher of Clinical Operative Dentistry my lectures are purely clinical lectures and cover the following subjects:

Relation of Operator to Patient.
Building of a Clinic or Practice.
Selection, Care and Arrangement of Instruments.
Sterilization of Instruments.
Guarding against Infection.
Care of the Hands. Uses of Water at Chair.
The Use of the Chair, Positions, etc., with Demonstrations.
Caries.
Examining for carious Cavities, and other Diseases.
Nomenclature of Cavities.
Cavity Preparation.
The Various Grasps and Rests.
The Dental Engine, Bars, etc.
The Rubber Dam. Kinds, Application, etc.
Clamps, When and Where to Use.
Starting Fillings.
Packing and Condensing Gold.
Contouring and Finishing.
Matrices, Advantages and Disadvantages.

The Use of Plastic Material.

Separations.

And so on thorugh all the various detail with practical hints and demonstrations.

As the work proceeds fewer lectures are given each week, the bulk of the time having been bunched in the early part of the year that the students may profit by them as early as possible; but I continue to meet the class frequently in the lecture room for short periods that I may make suggestions, correct errors, and urge the necessity of more careful work or to give them such practical hints as may be suggested to me as I see them working each day.

For the past seventeen years I have spent every afternoon in the operating room from two until five, giving only a suggestion here or a little help there, and sometimes I spend a half hour or more at some student's chair, who may have a difficult operation or who evidently needs a demonstration.

I do not myself see every case each day but some demonstrator does. I endeavor to keep in close touch with the work and progress of each student. It is in this way that I think the teacher should learn the needs of all the students, and by taking note of their common faults can call attention to them in the lecture room from time to time. It is in these after talks that much said before is repeated but in a different way.

This seems rather better than a fixed course that the student knows he will hear twice. Many students will profit by the two courses but many others will slight a lecture the first year because they expect to hear it repeated, and the second year they will slight it again because they think they have heard it before.

As a successful operator can only be trained by giving the closest attention to every detail it seems important to me that the teacher of that branch should present the subject with lectures as early in the course as he can in order to cover as early as possible all departments of the work to be done in clinic. In this way he knows how much the class is getting from the lectures and is in a position to remedy any deficiencies that become apparent. In our school a separate course of lectures, class exercises, laboratory and demonstrations covers the whole subject of Dental Pathology. This is covered in two lectures each week or sixty-eight hours in two semesters.

In giving this course Dr. Bunting uses Burchards and Inglis for reference. The outline of the course is as follows:

Facial Embryology.
Development of the Tooth and Surrounding Parts.
Blood and Nerve Supply of the Face and Teeth.
Surgical Anatomy of the Teeth.
Emption—Causes and Time.
Malformations—Macroscopical and Microscopical.
Abrasion and Erosion.
Stains.
Decay—history, causes, manifestations, etc.
Pulp Diseases—Constructive and Destructive.
Pericementitis.
Abscesses.
Hypercementosis.
Calculi—Sativany, Subgingival, Pyogenic, Pyhorrea.

Hyperaemias, Inflamations, Tumors, Specific Diseases, etc.. are given in another course under head of Oral Surgery.

DENTAL THERAPEUTICS.

Our Dental Therapeutics, as taught by Dr. Loeffler, comprises two distinct courses as follows:

1. Lectures and quizzes twice a week, beginning the second semester of the junior year and continuing through the whole of the senior year.

2. Clinical course during the whole of the senior year from 1:30 to 5 p. m., five times a week.

LECTURES AND QUIZZES.

The junior class, during the second semester, are required to attend two lectures or quizzes a week, as the case may be, upon the following subjects: Materia Medica with practical demonstrations of the principal forms of pharmaceutical preparations, the nature and properties of the most important drugs used in Dental Medicine. The intention is to give them in this course a brief outline of the classification of drugs with respect to their action as given in Long's text book.

Toward the close of the semester three or four lectures with practical demonstrations in oral prophylaxis will be given the juniors supplemented with work of that nature in the clinic as far as convenience will permit.

The essential feature of this instruction to the juniors is to have them become familiar with the remedies they are to use in the clinic. With this preparation much more time can be spent during the senior course in the practical application of drugs in treatments.

This year some demonstrations will also be given to the treatment and filling of root canals in natural teeth outside of the mouth especially in the case of molars and bicuspids.

The course during the senior year is opened, as a rule, with three or four lectures upon the principles and practice of Dental Medicine. Long's Materia Medica and Therapeutics is used as a regular text-book supplemented with appropriate chapters from Burchard—Inglis on treatment. All important topics from the Dental Magazines bearing on this subject are utilized. Written quizzes are given about once a month and a final examination at the end of each semester. In this course special attention isgiven to the practical application of drugs or other remedies in the treatment of diseases of the oral cavity.

CLINICAL COURSE.

This work is in charge of the chair of Dental Therapeutics; but the work of instruction is carried on as time will permit by all the faculty that take part in this clinical work. Practical demonstrations are given daily in the removal of pulps by means of arsenic and coacine, (high and low pressure anasthesia,) treatment of absesses, pericementitis, pyorrhoea alveolaris, bleaching of teeth, or any complications that may arise; also practical demonstrations in the use of local and general anesthetics for extracting teeth; oral prophylaxis, etc. This is in many respects the most important part of the whole course of instruction in Dental Therapeutics. Each senior has a list of 23 drugs, with which he is supposed to become thoroughly familiar before the end of the year.

Dr. Webster, Toronto. I wish to congratulate the essayist on that able paper; in fact, I would like to congratulate him on two or three essays upon different subjects,—and by that the committee will understand what I mean—but if these papers and this subject had been written by eight different men and each man given one thing to write about, we might have had the subject properly covered without repetition.

Dr. Tileston made use of the expression "Education is the accumulation of things remembered". We have a most beautiful example of this in the city of Toronto. He is a walking encyclopedia, but he could not come to a conclusion on the accumulated facts he has memorized. Though he has memorized so much he is the most ignorant man you could meet. This is not education.

Dr. Gethro, Chicago. There are just a few points that I might speak upon since the head of our operative department is not here.

We have demonstrators' meetings every week, and we find it is necessary for us to teach our demonstrators and continue their teaching, just the same as it is for us to teach our students, hence these meetings every week. It is at these meetings that the demonstrators report any errors or faults that they may have seen during the current week, and corrections are made. We also have some work along the line of written quizzes. I think these written quizzes occur at least once a month, and we consider them a very valuable part of the students training; and because of that sort of quiz, the students are working all the time, and at the real quiz we do not feel that we get very much out of it.

In Dr. Tileston's paper I do not remember whether he said anything about the students being compelled to go into the operatory, but I believe he did say that some schools permitted the students to start their operation when they were ready for it and not at a certain time. Our students are compelled to gain so many points in the junior and senior years, and we compel them to get a certain percentage of those points in each semester. In the junior year, the student is compelled to get 75% of his points; if he does not, he has failed in that subject, therefore he would have to take that subject over the next year, and it will surprise you to see how the students will look out for that. In the senior year it is the same. We have found that to be a very valuable asset in our teaching.

Dr. Cattell, Nashville, Tenn. I only wish to compliment the paper of Dr. Tileston. I cannot criticize it in but one point, and that is the teaching of two classes at one time. I have never understood how one can feel easy and comfortable in talking over the heads of the junior class while trying to reach the seniors; or talking under the appreciation of the higher class while reaching the lower. I do not believe we can accomplish as much by joining the two classes as we can to separate them, any more than we might join the freshmen and junior or the freshman and senior classes. I think we should create a course in operative procedures for each class and I believe that this is very much the better plan.

Dr. Shattuck, Detroit. I would just like to say a word in regard to a few points. We went into an agreement with the rest of the colleges for a four years' course, and then, with the other colleges jumped back to a three years' course. This gave us two senior classes one three months in advance of the other. I had to lecture on pathology to both classes and I think it was the biggest job I ever had in my life. However we ran our number one senior class on the whole four years, and I think we were the only college in the United States that ever graduated a four years' class. When we went back to the three-year course our seniors in the four-year course had no experience in the operating room, and we had to hold them over until April in order to give them those instructions.

Dr. Semans, Columbus. The method that I have taken up is this,—I teach Dental Anatomy, Operative and Clinical Dentistry, therefore I have each class through its entire course, from entrance until the graduation day. I hold Dental Anatomy myself simply for one reason. There are many times when I would like to hand it over to some one else, but I keep it merely to familiarize myself with each student. Within a week after entrance day in the fall I take the names of the students and get acquainted with these names. It is a very good scheme to familiarize oneself with them at the beginning. Having carried them on through the regular lecture work in Dental Anatomy in the first year, I start in the Junior year in Clinical Dentistry, noting somewhat the capabilities of the student to grasp the subject, until it is an easy matter to know the ability of each in practical work, and to know his aptitude for work, so that I will know the student I want to pick out and why I want to pick him out for a certain class of work. In other words, I know his weak or lame points, and can bolster him up and help him out, if such a thing is possible.

Dr. Clyde Davis, Lincoln. I have some ideas germane to this subject, which possibly may seem radical, yet I believe they are of good foundation. If we are to arrive at the proper method of presenting our subjects in dental college work, we will do well to study and possibly follow the plan of other educational systems in mapping out and presenting the collateral and fixed sciences.

We find this system, especially as to the establishment of prerequisites, well defined in large educational institutions, not only in the co-relation of subjects in a prescribed course, but in the subject matter as presented in the separate sciences. For instance: The student in a scientifically arranged medical course must study well his environment. The very air he breathes, the gases which are about him and the material of which everything is made; inorganic chemistry. Then the assemblement as we find in organic chemistry; then the organisms, anatomy; The functions of these organs; physiology: —then dissulotion'—disease; —then resolution—cure; etc.

Now, I believe that systematic course in Operative Dentistry technic, or any other course, must be mapped out along these lines in order to be successful. Presented, and the plan of PRESENTATION should be the HOW, WHY and WHEN.

Dr. Tileston, Louisville. I haven't very much to add, except to say that I appreciate the reception of my paper.

As to the matter of lecturing to the juniors and seniors together, there seems to be quite a difference of opinion. I do not teach the freshman class at all; they get this work in the technic laboratory, both in the freshman and junior years. I take the seniors and juniors together, because I can interest them for two years. My students do not cut my classes. If you find that you can not interest them, better divide them up. You can tell by the way they look at you whether you are interesting them or not. You look at an audience when addressing them and you can tell whether they are interested or not. I know when I am interesting my students. I do not repeat the same thing in a parrot-like way, year after year. I give them the principles, and try to impress upon them that this is something worth their while, and I succeed in doing this fairly well I think. They do not cut my lecturers in the junior year, and they do not cut them in the senior year. Of course, there may be some in the senior class who may not have heard my lectures as juniors at all, they having had their junior course elsewhere perhaps. The repetition that they get in hearing lectures twice will not hurt them a bit. There may be others to whom you cannot make clear what you are driving at even with two years of lecturing and laboratory instructions besides, and you may have to take them aside and give them a little private tutoring.

We cannot always fit a man to the chair that may be vacant in a faculty. I think the man who is making a specialty of Operative Dentistry is the man who is going to make the best teacher in that branch, better than the man who is devoting his time largely to some other phase of practice.

DR. WEBSTER.—Why would you separate porcelain inlays and gold inlays from Operative Dentistry?

DR. TILESTON.—I do not separate them, but I have found that I have all I can do in my chair without them. Another teacher has been given those special lines of Operative Dentistry to relieve me. They are taught under my supervision however. Operative Dentistry is a big subject and one teacher can not handle all the topics properly belonging to it. I do not attempt to teach bacteriology or pathology, which are taught in the laboratories, nor do I take up histology, except, as I said, to devote one hour to it. I do not teach histology. The students study histology in the laboratory, but I want to know that they thoroughly understand how the tissues they are to operate upon are made up, and what bearing that has upon operative procedures, etc., what the different structures are, what different instruments they should use, and the reason why. That is one reason I have for briefly reviewing histology. I do not lecture on pathology to teach it as the bacteriologist teaches it, but to connect it in general with operative procedures. These cannot well be separated. I do not see how anybody can teach operative dentistry without considering pathology. Those schools that have separate courses for seniors and juniors, devote a large part of the senior course, I believe, to lectures on practice, practice building, ethics etc. We have a chair on practice and ethics, and why not let somebody else, teach those subjects and devote your time to the teaching of Operative Dentistry and confine yourself to it. One of the hardest things to do in arranging the work of the different professors in the college is to keep them from over-lapping each other and making repetitions, and thus the student gets the same thing from different professors. I may give them something which properly does not belong to my chair, and somebody else may be giving it a great deal better than I can, and so I keep my hands off things that do not belong strictly and definitely to my chair.

TEACHING PROSTHETIC DENTISTRY.

BY WALTER M. BARTLETT, WASHINGTON UNIVERSITY.

ST. LOUIS, MO.

Prosthetic Dentistry and its teaching is such an important part of the college curriculum that I feel that the assignment of this particular subject to me was a mistake, as an outline of a course in Prosthesis according to my own ideas would necessitate the undoing of our present system. In advancing my suggestions to this body, I do not take the point of view of a pessimist, but I do feel very strongly that something must be done to instil into the student body a greater interest in this one subject that I consider the foundation of our profession.

As I look over the conditions existing today, I find that our curriculum is crowded to such an extent that one or the other of our practical branches must be neglected, and as a rule the one most disregarded is Prosthesis. After investigating the cause of the inattention of the major portion of the student body to this particular branch, I have arrived at the conclusion that the student is cognizant of the fact that he can become a practitioner without a practical knowledge of the construction of various classes of dentures. The teacher is aware of this and feels at times as though he were giving instructions in some lost art and they were being received solely because some day a technical and theoretical examination would take place. The reason for this lack of interest I attribute to the laboratories which are being run by skilled mechanics, who lost no time in realizing the situation, thus making it possible for a dentist to carry on a general practice and in this department be skilled only to the extent of securing impressions, occlusions and the necessary shade of teeth to be used. In the operative branch this cannot be done, as he alone must be the skilled workman. As a student, he knows these conditions and naturally devotes the most of his energies to that practical branch whose operations he and not some one else must perform.

Now the question arises, how are we to instil this interest into a student body so that all which is necessary to be performed will be a pleasure instead of a task?

First of all, the environments must be acceptable. Instead of a series of rough benches designed to seat a number of students, allowing one or two drawers for each student, a general plaster bench, sink, and a few odds and ends, found in the up-to-date college laboratories, we should so equip them that a student may enter the technic or practical laboratory with the same feeling that a progressive practitioner enters his well equipped operating room or laboratory. I would recommend an equipment for the college laboratory such as I here outline.

An ideal laboratory should be of such dimensions that each student could be provided with an individual bench with hard wood top, containing a sufficient number of drawers and compartments to accomodate the instruments required by the student for a thorough course in Prosthetic technic, including a vulcanizer, laboratory materials and paraphernalia, and a plaster box so constructed and placed as to insure the greatest cleanliness. The bench should further be provided with an opening through the top into a tight box for the waste plaster and refuse which accumulates during laboratory periods. The arrangement of the benches would presuppose a laboratory plan that would permit of even distribution of light and equal division of space, leaving, as nearly as possible, no choice between the benches, so far as advantages of location are concerned.

A sink and polishing lathe should be placed within easy access of each student. An electric lathe may be used, but I think the foot lathe is perhaps preferable for student use for two reasons.

First: By their own exertions in generating power, they acquire an idea of the necessary amount of contact pressure for grinding porcelain teeth or polishing a denture.

Secondly: The majority of students will be forced to use this after graduation.

With this individual arrangement of the laboratory equipment, each student should be held responsible for the condition of his bench and its appurtenances and also of his instruments.

When metal technic is being taught, the bench should have in addition to the above a drawer constructed for holding sand and the necessary molding instruments and a gas arm for the attachment of a Macomber blow pipe. A swaging block and hammer and a furnace for fusing metals should be placed within easy reach of each student. Adjoining the laboratory should be a demonstrating room, with the seats arranged in a semicircular amphitheatre. The instructor should be provided with a bench similar to those of the students, and it should be completely equipped with all the instruments and materials necessary for teaching the subject of Prosthesis.

Now that I have outlined the proper equipment of a laboratory, I will endeavor to arrange a course of instruction, whereby, with the aid of proper teachers, it is possible to graduate students who take an interest in, and are better qualified to practice, this branch of dentistry.

I would suggest a four-years course, the first year of which should be devoted entirely to Prosthesis and its allied subjects, such as Metallurgy and Physics, in order that the student might devote all of his time to this branch, without being hampered with others studies.

Under ideal conditions, the following technic could be successfully taught in the Freshman year.

First Exercise.—A thorough explanation of the use of all the instruments contained in the students outfit should be given to facilitate their manipulation.

Second Exercise.—A thorough explanation of all materials used for impression purposes, their physical properties, and where and when each should be used.

Third Exercise.—The taking of impressions for partial and edentulous cases. These should be taken from the mouths of hired subjects, a selection having been made that will not require any degree of experience.

These impressions should be taken in wax, modeling compound, and plaster of paris. In the case of the partial, the occluding arch should also be taken, using the materials suggested. This course would give each student twelve exercises in impression taking, which would be in advance of this technic as taught at the present time.

Fourth Exercise.—The compounding of the various varnishes and seperating materials used; shellac varnish, sandarach varnish, saturated solution of borax and schellac, soap solution, and others in general use.

Fifth Exercise.—The technic of application of seperating mediums.

Sixth Exercise.—The construction of the casts from the impressions taken.

Seventh Exercise.—Methods of seperating the various impressions from the casts, with exercise of repairing injury, should it occur.

Eighth Exercise.—Trimming the cast. This exercise should be divided into two . The casts derived from the impressions taken in wax and modeling compound should be trimmed for vegetable base construction, and those from plaster for metal work.

Ninth Exercise.—The placing of the casts derived from the modeling compound of the partial in plain line and those of the edentulous jaws taken from the wax and modeling compound in anatomical articulating frames.

To procure the relative positions of these edentulous arches for the student's use, the instructor should take impressions, form cast, and secure the proper occlusion; then properly mount in position in a stout articulating frame, from which the student can obtain the correct occlusion for his case at any time.

Tenth Exercise.—Construction of skeleton vulcanite bases on casts derived from wax impression. This exercise naturally includes the waxing of the base, flasking, packing, vulcanizing and finishing.

Eleventh Exercise.—Construction of partial case from articulated casts. This exercise comprises the outlining of the base, forming the base, selection of artificial teeth, articulating the teeth, waxing, flasking, seperating, preparation of surface prior to packing, packing, vulcanizing and finishing. If more than one partial case is desired, duplicates of the original casts can be procured, using wax for the impression material. To alter the form of the denture, remaining teeth may be cut away from the cast, increasing the edentulous space.

Twelfth Exercise.—Construction of a full upper and lower vulcanite denture, using plain teeth. This exercise should include the forming of occlusial base plates, the securing of the occlusion from the instructor's occluded mounted casts, placing the casts in articulating frame, outlining the bases, proper position and placing of a vacum chamber, forming bases of wax, selection of teeth, articulating the teeth, waxing, flasking, preparation of surfaces before packing, packing, vulcanizing and finishing.

Thirteenth Exercise.—Construction of full upper and lower vulcanite plate, using gum section teeth, which includes the same exercises suggested in Exercise 12.

Fourteenth Exercise.—Construction of an upper celluloid denture, with the corresponding lower of vulcanizable Gutta percha, using plain teeth. Duplicate casts may be made from those used in exercise 12 or 13.

Fifteenth Exercise.—Various repairs. Dentures which have been deposited with the college by preceeding classes should be used for this exercise.

Sixteenth Exercise.—The preparation of the cast forming models for molding purposes, both partial and full cases.

Seventeenth Exercise.—Preparation of the sands for molding. I would here suggest the use of the brass molders sand, or marble dust, for this exercise. The prepared sands should never be used for teaching purposes, as there is nothing gained from a technical point of view by the use of these preparations.

Eightteenth Exercise.—Forming the mold and casting the die.

Nineteenth Exercise.—Construction of both full and partial counter-dies, these dies and counter-dies to be retained by the student, to be used in his Sophomore technic course.

Where the class is large, it may be sectionized, as a means of obtaining better results in demonstrations.

The instructor should perform each exercise in the presence of the class, and explain theoretically and technically the instrumentation and manipulation of materials used in the exercise. Only such instruments and materials need be discussed as are used in the exercise. At the close of each demonstration the steps covered should be exhibited, in as near a state of perfection as possible, having been previously worked out and kept as teaching equipment. This point is advisable, because the instructor could hardly be expected to do perfect work before a section of students in a limited time.

If a class is large, the instructor in charge should be provided with a sufficient number of competent assistants to insure all the required individual instruction.

The laboratory periods should consist of a definite number of hours, at stated intervals, and a full attendance should be maintained during these periods. In the intervals between laboratory periods, the laboratory should be in charge of a competent janitor, who opens the doors at the beginning of each period, and locks them again at the close, thus preventing students from converting the laboratory into a lounging room and gambling den during leisure hours.

Each student should be required to finish his work to the best of his ability, and at the end of the session it should be placed in a box constructed to contain it, and turned over to the instructor in charge, and from this finished work he should grade accordingly.

In the Freshman year, a thorough course in Metallurgy should be given, including both didactic and practical instructions. Complete laboratory equipment is imperative for the teaching of this important collateral branch of Prosthetic Dentistry, for without it, the student becomes a theorist and in most cases is lacking in practical application.

The only other requisite of the Freshman year is the study of Physics, and every effort should be made, in securing an instructor and equipment, to make the course as profitable as possible to the student.

I recommend the teaching of these two subjects in the Freshman year because they are so closely allied with all that is to-day called Prosthetic Dentistry. A good knowledge of these as a foundation will make it possible for the student to fully understand those things which he is taught and shown, as he advances from the Freshmen to the Senior year, and will simplify the work of the instructor.

In the Sophomore year, the technic course must be limited, on account of lack of time. This course must not encroach upon other duties which the student is necessarily called upon to perform. By placing Metallurgy and Physics in the Freshman year, fifteen hours a week can easily be devoted to their teaching. Such being the case, the following course can be successfully conducted in the Sophomore year;

First Exercise.—The manipulation of the mouth blow pipe, in order to acquaint the student with the various flames necessary in annealing, fusing and soldering metals generally used in the construction of the various bases. (In equipments I recommended Macomber pipe, as I consider it one of the best mouth pipes).

Second Exercise.—The sweating of two strips of metal together, the joining of bands by means of solder, soldering wire pins to strips of metal, flowing and teasing solder upon metal surfaces.

In these exercises, if possible, the metals used in base construction should be used. With these experiments the student should become to a degree skilled in the use of the blow pipe.

Third Exercise.—Construction of the various styles of clasps. First: the bending and adapting of clasps to various forms of natural teeth. Second: construction of clasps by burnishing, reinforcing with platinous gold flowed on surface, soldering tails, spuds, or pins, to clasps for vulcanite attachment—bent clasps with soldered attachment to rest in deep fissures of occlusial surface of molars.

Fourth Exercise.—Partial upper and lower denture, swaged metal bases, double laminae.

Upper teeth backed and soldered.

Lower teeth attached by means of vulcanite.

This exercise comprises all that is important in technic of metal construction as practiced to-day, i. e., the selection of proper guage metal, swaging, adjusting and attaching clasps to base if necessary, proper grinding of teeth for cervix support, alignment and occlusion, placing backing stays, investing, heating, soldering and finishing. The lower technic includes, besides swaging and clasp attachment, grinding and articulating the teeth, waxing locating position of finishing wires, removal of wax carrying the teeth, soldering in position the finishing wires, soldering pins in place to afford additional attachment between base and vulcanite after induration, replacing of wax carrying the artificial teeth, waxing, carving, and the next steps toward completion, such as flasking, packing, etc., etc.

The dies and models for the construction of these cases were formed in the Freshman year, and preserved for this special exercise.

Fifth Exercise.—The forming of various vacuum chambers used in metallic bases, such as Gilberts, simple soldered, soldered chamber showing no outlines on lingual surface of base. These can be constructed upon dies specially prepared for this exercise..

Sixth Exercise.—Construction of full upper denture, metal base wired, soldered vacuum chamber, using plain teeth, vulcanite attachment. This exercise covers all the important technic of combination dentures.

Seventh Exercise.—Full lower denture, cast base, plain teeth, vulcanite attachment. In this exercise the student becomes familiar with the technic of cheoplastics.

The models and dies for exercise six and seven were formed in the Freshman year. Necessary occlusions are obtained from the casts occluded by the instructor and retained for this exercise.

Eighth Exercise.—Full upper swaged aluminum base for vulcanite attachment. This is simply to familiarize the student with the working properties of aluminum and the necessary preparations to be given the surface for vulcanite attachment.

Ninth Exercise.—Full upper cast aluminum base for vulcanite attachment. The technic is similar to other cheoplastics, with the excepting of casting, which is here taught.

Tenth Exercise.—The construction of a full upper continuous gum denture, carrying it up to the porcelain stage. Were it not for the expense, I would demand a finished piece, as I am of the opinion that in this class of work more can be taught a student from an artistic point of view than in any other. As it is, in this exercise he obtains a knowledge of special die construction, swaging, forming of necessary rim and posterior finishing pieces, artistic arrangement of artificial teeth, method of investing adjusting backing stays, or supports, difficult soldering, and finally the covering of the surface with pink paraffine, wax, carved to represent the piece as it should be finished in porcelain. The technic metal used for this class of work is German silver. In the other metal bases, for want of something better, brass is still used.

The Sophomores, in addition to the course outlined, should commence the technic of crown and bridge construction. The instructions on this subject should be given during hours specially designated for its teaching, and the same methods as heretofore suggested for imparting the necessary information should be adopted.

This course should comprise the following exercises:

First Exercise.—A thorough familiarizing with all the instruments, appliances and materials used in crown and bridge construction.

Second Exercise.— Various methods of preparation of teeth and roots of teeth and their canals, for the carrying of banded, bandless dowel crowns.

Third Exercise.—The forming of bands, partial bands, and necessary diaphrams; swaged diaphrams, constructing crown and proper placement of the same. From this exercise the student obtains the fundamental principals of various crown constructions, and also becomes familiar with the proper manipulation of the blowpipe for delicate and accurate soldering.

Fourth Exercise.—Shell crown construction, sectional and seamless, re-establishing occlusial surface by carving when sectional method is employed.

In this exercise the instructor should demand of the student a reproduction of the lost organ of mastication, as far as it is possible to obtain it.

Fifth Exercise.—Construction of Richmond crowns upon banded, partial banded and bandless diaphrams. This exercise includes, besides base construction, the selection of teeth, grinding and articulating of same, backing, investing, preparation of metal surface prior to soldering, heating of investment, proper manipulation of blowpipe during the soldering period, and finally, finishing.

Sixth Exercise.—Mounting Logan crowns; demonstrating the necessary requisites for abtaining the best results when these ready made substitutes are to be used.

Seventh Exercise.—Technic of various forms of dummy construction; dummies carrying facings and those constructed entirely of metal, developing the principles of strength, and the proper restoration to insure necessary hygienic surfaces.

Eighth. Exercise—Construction of four tooth bridge, first molar to cuspid tooth, supporting bicuspids. I would suggest that this bridge be constructed as follows: The cuspid root should be prepared for a bandless diaphram carrying proper dowel, using ordinary plate tooth, the molar, a shell crown. First bicuspid, steel facing, lingual restoration anatomically reproduced. Second bicuspid, of metal construction anatomically reproduced. Following this suggestion four exercises could be included in one, as to methods of crown and dummy construction.

At the completion of each exercise demanded of the student, he should turn over his finished piece to the instructor in charge. In case it is not satisfactory, the student should be compelled to repeat the exercise. By a strict enforcement of this rule, a student will be made to take more interest, and will devote his best energies to producing a piece of work which will meet his instructor's approval. On the other hand, if any careless workmanship is accepted, it instills into the student a desire to slight his work, in order that he may complete his course in as short a time as possible.

With the beginning of the Junior year, both technical and practical instruction should be given.

The technical instruction should include only the construction of porcelain crown and bridge work; while practical instruction should be given at the chair. enabling the student to make use of his technical acquirements and at the same time training him to develop that which is of paramount importance to every practitioner, namely, proper judgment.

In the porcelain technic course, I would make the following suggestions. I again emphasize the necessity of thorough instruction in the use and manipulation of instruments and appliances, and a perfect knowledge on the part of the student of the materials used, especially of porcelain.

With these preliminary instructions, it will be noted by a careful teacher that much of his labor has been lessened.

First Exercise.—Technic of metal construction for anterior and posterior crowns.

Second Exercise.—Technic of adaption of facing to same; investing and soldering.

Third Exercise.—Fnishing prior to application of porcelain body.

Fourth Exercise.—Technic of mixing the porcelain bodies forming various given forms, and the fusing, from the biscuit to its final vitrefication.

Fifth Exercise.—Technic of application of porcelain bodies to crowns; carving and re-establishment of anatomical form.

Sixth Exercise.—Technic of fusing and final finishing.

Seventh Exercise.—Construction of metal frame work in bridges using saddle.

Eighth Exercise.—Technic of attaching teeth in bridge construction.

Ninth Exercise.—Application of porcelain, carving and proper fusing.

Tenth Exercise.—Setting of crowns and bridges with Gutta Percha and cement, or a combination.

There is no method now in use which I would feel justified in suggesting for a technical cast construction to be used in crown and bridge work. In preference to a technical course, I would prefer to include this in the practical instructions.

In the department of practical instruction, the student's names should be placed in alphabetical order, to expedite the distribution of work. After the assignment of a patient to a student, it should be the duty of the instructor, or his assistant (whose teachings should always be in accord with those of the instructor), to give individual instruction to the student as to the requirements of each case presenting itself, making of each case a practical lecture.

As an illustration: A case presents for a denture. The instructor first makes a thorough examination of existing conditions, and while he is making the examination the student who has been assigned the patient stands on the left side of the chair (other students may gather about, but should not interfere with the student who is to handle the case). After the instructor has completed the examination and has decided what is best to be done, he changes place with the student, and has him make an examination, during which the student's attention is called to existing conditions, and he is instructed as to the best methods to adopt in the treatment of these conditions to secure a surface which will afford the proper support to the denture. A clear explanation should be given, not only of what is to be done, but of the reasons thereof.

In securing impressions, the same procedure should be adopted, instructing the student along lines to develop his judgment as to when and why he should use the various impression materials, whether alone, or in combination, to enable him to secure a surface of uniform density if necessary. From this on, step by step, he should receive special instruction as he progresses with the construction of the denture. Finally, when completed, it should be the duty of the instructor, or his assistant, to place the denture in position, to point out any defects found, and to explain clearly why they exist and how they could have been avoided. In other words, by the adoption of this method, the student obtains a special practical lecture on every operation he is called upon to perform, which is worth more to him than a dozen didactic lectures where he has no chance to see the conditions of which the lecturer is talking.

This practical course commencing in the Junior year should include all operations except porcelain crown and bridge construction. The student is occupied with the technical course of this work in the laboratory and has not advanced to its practical application.

With the Seniors, this practical instruction should continue, endeavoring to make each student construct as many dentures as possible, whether they be of vulcanite, celluloid, cheoplastics, or metal bases, or crown and bridges. With each new case, the same special instructions should be given, for two reasons: First, we never find conditions exactly alike. Second, repetition in teaching is beyond a doubt the best method of impressing a subject upon a student's mind.

In the Senior year, a didactic lecture course should be given one hour per week. This course should include the History of Prosthesis; the origin, conception and introduction of the various dentures, instruments and appliances; methods of constructing dentures which are at this time considered obsolete; methods of constructing obturators, velums and inter-dental splints. Any other subject which has been omitted from the technical, or practical course, may properly be covered here.

I have not included in the technical, or practical departments of this subject that of the construction of obturators, velums, or splints, because I am of the opinion that the time necessarily devoted to its teaching can be used more profitably in some other direction. It is a class of work which we are seldom called upon to perform. Should a student, after graduation, move into a community where there is a demand for it, let him take a special course with some operator who is skilled in this line, as does a graduate of medicine who expects to specialize on some one branch of Medicine or Surgery.

Prior to the rapid advances in the methods of treating malposition of the teeth, it was appropriate to include a course in Orthodontia technic in the department of Prosthesis. In the earlier days, it was customary for the practioner to construct his mechanisms for treatment, making it necessary for the colleges to instruct students in the essentials of appliance construction. The introduction of standard forms of appliances, which are carried in stock in a large variety of patterns by dealers, and adaptable to nearly every type of case, completely removes this necessity. I therefore omit it from the course outlined.

I admit that a technical laboratory course in orthodontia is still a necessity, but owing to these fundamental differences in the methods of past and present, rendering the older methods obsolete, and the rapid rise of this speciality, I deem it best for the teacher of Orthodontia to design a course and teach it separately.

If a college possesses an instructor with the necessary associate assistants who are competent to perform and explain minutely the details and theoretical principles involved, I am of the opinion that the course I have here outlined would enable us to produce graduates who would take an interest in Prosthesis to such an extent that the future of this department need not cause us any worry.

THE TEACHING OF DENTAL CERAMICS.

W. L. FICKES, D.D.S., PITTSBURG DENTAL COLLEGE, DEP. OF W. U. P.

The first consideration in the art of education is the end to be accomplished. We are not troubled so much to find the end, in teaching dentistry, as are those who teach for general education. We have the definite aim to make successful dentists, skilled in all branches of the profession. How to accomplish this is as much of a problem to us as the finding of a definite aim is to the general educator.

The success of the teacher of a techincal art depends, to a great extent, on the mental power and plasticity of the mind of the student. The attainment of technical skill, as well as the acquisition of all knowledge, depends, to a considerable extent, on these attributes. The degree of success of the teaching process is indicated by memory of the subject, and by the display of skill in the application of that knowledge. We should, therefore, take into consideration those properties of the intellect upon which acquisition and memory depend, and all other qualities, intellectual and emotional, which might assist in the general result. That is, stimulate and train perception and conception by presenting the subject in such a manner as to attract and sustain the attention. This can be accomplished much more readily if the study of the subject can be made a pleasure.

The acquisition of knowledge and skill is much easier to the student if the various divisions of the subject and the methods of work are arranged in logical order, according to their simplicity or complexity, and their interdependence.

Dental Ceramics is a branch of dentistry which is correctly defined as an art. An art is the acquisition of knowledge and its practical application. The knowledge required for application in Ceramics can be obtained in various ways, but the logical order of teaching seems to be, first: By the presentation of ideas to the student by lectures, class work, text-books, etc.; Second: by showing him how to apply those ideas to the work, as by clinics, specimens of work, models, etc.; and finally by teaching him the practical application of the ideas, with the assistance of demonstrators, under the direction of the teacher. This is the plan generally followed in the teaching of the arts with which Ceramics would naturally be classified, and is the method which we have endeavored to follow.

Methods which will stimulate the interest and hold the attention of the students must necessarily be used. In order to accomplish this, we should have a general knowledge of the practical application of psychology to teaching, as well as a thorough knowledge of the subject, and how to adapt the subject-matter and methods to the capabilities of the class and of the individual student. In teaching in classes, we have to consider the general average of ability. Our methods should conform to the average of mental power and manual dexterity. To raise this average by training the students in knowledge and skill is the problem of the teacher.

I have nothing new to offer as to methods of teaching Ceramics, but will outline the course we are following at present, with the hope that it may be of assistance to some, and that it will cause a discussion which will be of still greater benefit to us, who are teaching this subject. We endeavor to improve the arrangement and methods each year, and find it necessary to change our plans accordingly.

The didactic course consists of thirty lectures to the senior class illustrated by drawings, charts, models, specimens of work, materials, instruments, appliances, etc. Lectures on the various methods of work are followed, when practicable, by clinics and demonstrations, after which the student performs the technical work corresponding to the lecture and demonstration. All methods or classes of work which are considered good, and which are not proper subjects for history, or which cannot be included in the technical course for lack of time, or for other reasons, are explained, as explicitly as possible, in the lecture course.

The order of arrangement of the various subjects and their subdivisions is as follows:

INTRODUCTION.—Definition of Dental Ceramics. Place in Dentistry. Outline of the course, etc.

HISTORY.—History of porcelain. History of porcelain in Dentistry.

Evolution of methods, with description of past methods.

PORCELAIN BODIES OR COMPOUNDS.—Constituents of porcelain. Properties and characteristics imparted by each. Methods of compounding. Relative merits of various bodies. Mineral stains, or colors.

CHEMICAL AND PHYSICAL CHARACTERISTICS OF PORCELAIN. Comparison of glass and porcelain. Structure, density, strength, fusibility, shrinkage, etc., of porcelain.

MANIPULATION OF PORCELAIN BODIES.—General methods applicable to all classes of work. Methods applicable to special classes of work. Instruments and their uses. Mixing, building carving, drying, fusing, annealing, etc. Methods of producing hues and tones of colors.

FURNACES.—Description of various furnaces. Manner of use and methods of repair. Regulation of heat. Heat required for fusion of various classes of work. Heating, cooling and annealing of work.

OUTLINE OF OPTIONAL LABORATORY EXPERIMENTS AND TESTS FOR SHRINKAGE, FUSING POINTS, COLOR AND CONTOUR.

INLAY WORK.—Value of porcelain as a filling material. Indications and contra-indications for the use of porcelain as a filling material. Instruments and materials. Their uses.

CAVITY PREPARATION.—Principles applicable to all classes of cavities. Separation, Guides to contour, Occlusion, etc. Description of preparation of special cavities. Comparison of cavity preparation for porcelain and gold inlays.

MATRICES.—Platinum and gold matrices. Characteristics, and comparative advantages of metals used.

ADAPTATION OF MATRIX.—Burnishing method. Impression method. Instruments, appliances, materials and their uses.

METHODS OF SELECTING COLORS—Modifications or changes caused by varying conditions under which examination is made. Varying conditions of sunlight and of artificial light. Effects of contrast of colors. Effects of binding medium and other influences. Method of examination and selection of colors.

METHODS OF PRODUCING HUES, TINTS AND SHADES OF COLOR.—Light and color. Various properties of light. Effects on inlays. Mixture of colors or pigments. Modifications of colors, intensity of hue and tone, through various influences. Effects of varying thickness of layers, and of varying intensities of hue and tone of colors.

METHODS OF APPLYING AND BAKING THE BODY.—Layer method. Other methods. Aids to retention. Use of cores for contour and to control shrinkage, etc.

PREPARATION OF INLAY AND CAVITY FOR SETTING.—Removal of matrix. Etching, undercutting, or grooving. Other requirements. Setting inlays.

SPECIAL METHODS OF INLAY WORK.—Rod inlays. Porcelain ground to fit the cavity. Ready baked inlays. Moldable porcelain. Use of posts, pins, loops, etc., for retention.

CROWN WORK.—Instruments, appliances and materials. Platinum, iridio-platinum, gold, flux, veneers, etc. Platinum solder. Oxyhydrogen, alcohol and gasoline blow-pipes. Soldering. Impression trays, occluding frames, impressions, models, etc.

INDICATIONS AND CONTRA-INDICATIONS FOR USE OF PORCELAIN IN CROWN WORK.

REQUIREMENTS OF ROOT AND TOOTH PREPARATION.

STRUCTURAL REQUIREMENTS.

INVESTMENTS.—Small investments. Large investments. Methods. Soldering blocks. Heating investments. Soldering.

BUILDING, CARVING, DRYING AND BAKING.—Application of the body. Use of facings. Requirements for strength of framework. Protection and support of porcelain against stress. The influence and necessary allowance for shrinkage. Precautions in heating, fusing, annealing and cooling of the work.

THE BAKED, POST, CAP AND COLLAR CROWN.

THE CAP, POST AND HALF-COLLAR CROWN.

THE CAP AND POST CROWN.

JACKET CROWNS.

THE DOUBLE CAP AND TUBE POST CROWN.

THE LOGAN AND DETACHABLE POST CROWNS ON CAPPED ROOTS.

CROWN FOR ROOT ACCOMPANIED BY RECESSION OF THE GUM.

VENEERING SEAMLESS GOLD CROWNS WITH LOW-FUSING BODY.

MOLDABLE PORCELAIN AND ITS USE IN CROWN WORK.

PORCELAIN BRIDGE WORK.—Indications for use. Limitations. Conditions necessary to success.

STRUCTURE OF FRAME WORK.—Preparation of teeth and roots. Capping and crowning. Bars, saddles, impressions, bites, models, etc. Assemblage of parts. Use of facings. Soldering.

APPLICATION OF BODY.—Cleaning frame work. Carving, contouring, drying, baking, annealing, finishing and setting.

VARIOUS METHODS OF CONSTRUCTION.—Removable bridge work. Stationary bridge work.

CONTINUOUS GUM DENTURES.—Impressions, models, materials, and instruments.

Construction of Frame Work.

Application of the Body.—Carving, contouring, control of shrinkage, drying, heating, baking and finishing.

Mineral Colors or Stains.—Characteristics and uses of mineral stains. Application. Firing.

The arrangement of subjects, as here presented, may not appear to be the best that could be devised, but I have tried to present those principles and methods which apply to all classes of work first, while those which apply to special work are presented under special headings. The subjects are also arranged, as far as possible, from the simple to the complex.

We have no text-book which has been recommended exclusively, but we advise the students to buy Goslee's Crown and Bridge Work, Gilbert's Notes on Dental Porcelain, and to read the chapters on porcelain in the text-books adopted by the College.

In the preparation of the manuscript for the lectures, the text is written out, complete in every detail. To the left of each paragraph are concise notes, arranged to correspond to each line of the text, and to the left of that are questions also corresponding to the text. To the right of the page, on the margin of the paper, are notes referring to models, specimens of work, reference books, etc., to be used in illustration of the text or for the student's reference. When an illustration is to be used (either a prepared drawing, photograph, lantern slide, or black-board drawing), a miniature drawing is made on the right hand margin, opposite the paragraph which it is to illustrate.

This arrangement of the manuscript is for the purpose of order in the presentation of the subject and for logical sequence of questions, as well as to prepare for the presentation of the lecture by a demonstrator, in case of the illness or unavoidable absence of the regular lecturer. I wish to say, however, that the lecture is much more effective, if it is delivered with but occasional reference to the manuscript.

Quizzes on the previous lecture are conducted ten or fifteen minutes before each lecture. This recalls to the mind of the student the important points covered, arouses his interest in the subject, and quiets and prepares him for the renewal of the discourse.

The questions are arranged, as has been explained, in the order of the text; refer to a definite, important portion of the subject-matter; are given in clear, terse, precise language; and can only be answered, correctly, in one way, unless they require descriptive answers.

The question is asked and then a student's name is called. A slight pause between the question and calling of a name gives each student an opportunity to mentally form an answer.

An extra hour each month is devoted to quizzing on the subject-matter of the previous month.

Two examinations are given each year, mid-year and final; the questions, ten in number, being arranged in logical order corresponding to the lectures. Several practical questions are usually given, which can be answered in one sentence, and two or three which require descriptive answers.

As previously stated, the technical course is so arranged as to follow, in the same order, the subject-matter of the text. The class is divided into divisions of ten students, each division working two hours each week. When a student has completed the requirements, he is excused.

The teaching process is simplified by pointing out the differences in construction of the several classes of work, the students having received technical instruction in metal plate, crown and bridge work, and also in cavity preparation in the first and second years.

The first requirements are to mold, carve and biscuit two large teeth in porcelain; to cut a labial cavity in one and an approximal cavity in the other; to bake these teeth, attention being called to the requirements of cavity preparation, building, packing, absorption of moisture, carving, drying, firing, vitrification, shrinkage, etc.

Platinum matrices are swaged and burnished into each cavity, and inlays are completed in each matrix of high fusing porcelain.

The next step is the preparation of a cavity in a typodont; the burnishing of a gold matrix in the same; and the completion of an inlay of low fusing body.

Two porcelain crowns are then constructed, showing the various principles of crown construction, from the preparation of the root to the final annealing and finishing of the piece.

This is followed by the construction of the frame work for a porcelain bridge, of german-silver, facings in position, one abutment, a cap and post crown and the other a shell crown. This gives the student experience in the construction of another class of porcelain crowns.

This work can be constructed of platinum, iridio-platinum and porcelain, at the option of the student.

The frame work for a continuous-gum denture is then constructed of german-silver, teeth in positon, carrying out all the details of the work except the application of the body and firing.

In classes of ten they construct a frame work of platinum and complete a continuous-gum denture, to the final baking and finishing of the piece. They choose one of their number to carry out the several steps, the others being present throughout the work.

Finally, they are required to stain several teeth with mineral stains, to show the various effects which can be produced by the use of these materials.

The technical course is as complete as time will permit, and is designed to cover the principles of the several classes of work.

In marking the students for their standing and averages, we allow forty per cent for the highest marks in technical work, ten per cent for quizzes, twenty per cent for mid-year examination and thirty per cent for the final examination.

I hope you will pardon me if I speak, with a teacher's pride, of the fact that a number of our recent graduates have appeared creditably before fraternal, local and state societies, with clinics, demonstrations and papers. I can recall to mind a few of these young men who I have no doubt, will soon rise to high positions and to the attainment of National professional standing. The other graduates, with but few exceptions, are ethical and progressive professional men.

DISCUSSION.

Wm. M. Randall,
Louisville, Ky.

I wish to compliment Dr. Fickes' paper and the comprehensive contents of same. It seems that our teaching methods are becoming more appreciably in accord with one another from year to year.. Our didactic course consists in a series of twenty lectures, practically the same in arrangement of outline and course of instruction except not so much in detail, owing to number of lectures allotted to this subject.

It appears to me just at present that Ceramics should include the use of the improved enamels that have been lately introduced to the profession and to my mind if two more years will prove the "Ascher's Improved Enamel" of the same appearance and service that the past two years have, we will be compelled to grant the larger field of our porcelain inlay work to these materials or similar ones. Of course it will be necessary for a little more time to elapse to prove this; however, to my mind these materials are going to revolutionize dentistry in the anterior part of the mouth as a filling material; if they have not already done so.

I believe in making the student do a large variety of work and just enough of each variety to teach him the working principals and fundamentals of practical work; thus giving him the foundation broad and sound in every particular; and let the student build or not build; along' porcelain lines as his taste and talent demand when he enters upon the practice of his profession.

The porcelain technique requirements for each member of the Senior class and of the Operatory are as follows:

I.—**Cleaning and the Preparation of all extracted Teeth used in Course as provided by the Instructor.**

II.—**Simple Inlay on Buccal Surface of Superior First Molar Low Fusing, Jenkins Body.**

(a) Preparation of the cavity.
(b) Burnishing of the gold matrix.
(c) Second burnishing of matrix after the first biscuit bake.
(d) Third and final baking of the porcelain.
(e) Retention for the inlay.

III.—**Large Simple Cavity of the Occlusal Surface of the Superior First Molar Jenkins—Low Fusing.**

(a) Form and preparation of the cavity.
(b) Method of adapting the matrix.
(c) Method of packing a porcelain body.
(d) The proceedure of burnishing.

IV.—**Complex Single Step Cavity (A Disto) Occlusal Cavity, Single Fusing—Brewster's Body.**

(a) Form and preparation of the cavity.
(b) Cement impression of the cavity.
(c) Burnishing the matrix over the cement impression.
(d) Steps in three bakings.

V.—**Mesio, Incisal, Not A Step Cavity on Superior Lateral Incisor—Brewster's High Fusing.**

(a) Preparation of the cavity.
(b) Retention form and dowel attachment.
(c) Method of uniting Dowel and matrix before baking
(d) Proceedure of maintaining form of contour in baking.

VI.—**Mesio-Incisal Single Step Cavity on Superior Central.**

(a) Special attention to the cavity preparation and outline form.

(b) Swaging matrix into cavity with modeling die.

(c) Secure definite margins and assymetry of contour.

VII.—**"Dowel and Ferrule" Porcelain Crown.**

(a) Superior cuspid with a facer.

(b) Pattern for a cap and ferrule.

(c) Method of attaching facer.

(d) Proceedure in four steps of articulating and baking.

VIII.—**"Dowel and Ferrule Crown" on a Superior Bi-Cuspid.**

(a) Given a short bite without a facer.

(b) Skeleton of the body of the bridge.

(c) Angles and attachment of the bridge with its braces.

(d) Attachment of the facers.

(e) Grinding the facers for a normal articulation and occlusion.

IX and X.—Construction in Detail of Skeleton for Porcelain Bridge with Facers Soldered Ready for Baking.

(a) Preparation of abutments.

(b) Superior right cuspid and Superior right molar.

(c) Caps and bands with Dowels attached.

(d) 15 gauge round platinoid wire is used.

(e) Design of skeleton between abutments.

(f) Grinding and shaping facers.

(g) Attachment of facers.

Requirements of Operatory.

I.—One low-fusing Inlay of Jenkins body.

II.—Two High-fusing Inlays, one of the impression and swaged method; another of the burnishing method.

III.—One porcelain baked crown with cap and Dowel with facer attached.

Charles K. Buell,
Buffalo, N. Y.

It was with a great deal of interest that I read Dr. Fickes' paper, and I want to congratulate him upon having so systematic a course in Dental Ceramics.

To the attributes mentioned, as necessary to the student, I would like to add that of manual dexterity, or mechanical skill, as in my opinion this attribute being absent, no amount of training will ever bring the student to a high plane of efficiency in Dental Ceramics.

In our course we use the lantern very much, throwing upon the screen views, the slides for which we prepare ourselves. With these slides we are able to have the lights turned on, so that the student can takes notes during the lecture. Two or three crowns are covered in one lecture, thus making them more emphatic, by contrast.

This method, together with the aids mentioned in the paper, make it possible to cover the course in fifteen lectures, thus giving the student more time for actual work in the laboratory, which in our opinion is the essential thing for advancement in Dental Ceramics.

The Didactic course as outlined is so similar to the one we follow, with the exceptions mentioned, that there is little for me to say, however, as there is no detail mentioned, there are a few points that I want to bring out for discussion.

Cavity Preparation.—In the freshman year the student is required to mould from clay two teeth, a superior central and cuspid, about ten diameters larger than the natural tooth. In these teeth he carves the typical cavities, especial stress being laid upon the cavity form with the reasons for this form. (Exhibit clay teeth).

Matrix Making.—Into these cavities he works No. 60 tin foil with pine sticks and cotton, finally burnishing to the margins with large burnishers. By this method cavity formation and matrix making are taught on so large a scale that it is easier for the student to grasp the points taught.

Selection of Colors.—In selecting the colors for a porcelain tooth the student is taught: First, to cover all but the cervical portion with the fingers. Second, to match this with but a small portion of the sample shade exposed between the fingers. The incisive portion is treated in the same manner, thus making the match much more accurate. The blending of the colors is taught by the lapping method.

Cementation.—Especial stress is laid upon the grooving method as his is thought to give the best results.

Dictation in Crown Work.—Each crown when lectured upon is built up from lake sand, slightly moist so as to admit of packing and carving, upon a base made of tin to represent the platinum base. This is done on so large a scale as to be readily seen from all parts of the lecture hall, and the technique of the carving easily shown.

Technique of Carving.—The carving of porcelain is first taught by requiring the student to carve from the ordinary blackboard crayon the crowns to be made. The crayon is slightly harder than the porcelain body but carves in a very similar manner, and the smoothing which is accomplished with the ball of the finger is taught at this time. (Exhibit crayons).

The Hand-Carved Crown.—This crown is given especial emphasis for the bicuspids, the steps in its construction are shown by the accompanying drawings. Points claimed for it: Sufficient strength for all services required of it. No band to cause irritation. Perfect adaptation to the root. Less tendency for cement to dissolve, as porcelain and not metal comes in contact with the root. The acme of perfection from an esthetic standpoint.

Quizzes.—The devotion of fifteen minutes each lecture hour, together with an extra hour each month, to quizzes the majority of the questions referring to "definite subject matter" the answers to which, as I understand it, always being the same must tend toward empiricism.

We devote less time to quizzes and so frame our questions that the student must use his reasoning faculties and not his memory alone in answering them.

Laboratory Requirements.—One plate and dowel crown. One porcelain Richmond crown with wing and spurr attached. One all porcelain bicuspid, hand-carved. One porcelain jacket crown. Four inlays, two high and two low fusing. The skeleton for a bridge or continuous gum piece.

Infirmary Requirements.—Each senior student is required to make two practical crowns and one inlay, that will pass the required number of points.

Scale of Marking.—Quiz record and attendance for the term count twenty-five per cent. Laboratory work counts twenty-five per cent. Final examination and Infirmary points count fifty per cent.

Dr. Lyons,
University of Mich.

It is not without a feeling of considerable embarrassment that I attempt to impress my feeble efforts upon this magnificent body in the discussion of this paper, on account of my limited experience as a teacher of Dental Ceramics.

First of all I wish to compliment the essayist on the very excellent outline he has given us for the teaching of this course.

To-day, Dental Ceramics probably represents the highest dental achievement, and it seems to me that to properly teach this subject, we should take into consideration the preparation of the student, and also, how and in what order this subject shall be taught, so that he will receive the most benefit therefrom.

From the standpoint of the preparation of the student, I do not think it advisable for him to begin the work in porcelain until he has mastered the technique in metal crown and bridge work, and also the operative technique for gold fillings. This will be an aid to him in the successful application of porcelain. He should also have completed the courses in Chemistry and Metallurgy, so that when the composition, characteristics, and manipulation of the different porcelain bodies are taken up it will mean something to him. His thinking and reasoning powers are developed by this time so that when a fact is stated he will be better able to comprehend its significance.

The method we are pursuing now is much the same as that outlined by the essayist. We first present the ideas by lectures, then where it is practicable the lecture is followed up with demonstrations and the technique work corresponding to the lecture, thereby impressing the ideas upon the student in a practical manner. For instance, we follow up the lectures on molding, carving, fusing, shrinkage, etc., by at once having the student mold, carve and fuse a large tooth, thereby giving him practical experience in molding, carving and fusing, and enabling him to study for himself the property of shrinkage. This method of teaching is followed throughout the entire course on Dental Ceramics. We feel that by teaching in this manner, that the ideas which are presented in the lecture room are "driven home and clinched" by the technique work in the laboratory before the student has time to forget what has been presented to him by the lecturer.

The order in which this subject can be taught most successfully is conditioned in a measure by the different schedules of study in the various dental colleges. The essayist well says that it is the highest aim of the dental teacher to make successful dentists. In order to accomplish this purpose, the different courses must be taught in perfect harmony, the schedule of study must be so arranged that the courses will not conflict one with the other. We who are teaching porcelain must recognize the fact that it is only one of the many available materials with which to restore lost natural tooth structure, and in teaching this subject it must be taught in harmony with the other courses. To this end we are teaching in a reverse order the course as outlined by Dr. Fickes, and have the crown and bridge work precede the inlay work. At the beginning of the course in porcelain, our students have the principles of the metal crown and bridge work firmly fixed which is an aid to them in the successful manipulation of the porcelain crown and bridge work. By the time they are ready to take up the inlay work, they have the cavity preparation for gold fillings firmly fixed so that when they take up the cavity preparation for inlays, they are better able to grasp that without becoming confused.

The essayist has stated that the success of a teacher of a technical art depends to a great extent on the mental power and placticity of the student. I will go a little farther and state that the success of a teacher of a technical art depends not only upon the acquisition of knowledge, and the exhibition of technical skill displayed by the student, but also upon the personality and enthusiasm of the teacher. First, the teacher should have a most thorough knowledge of his subject, then he should be able to present this knowledge with the enthusiasm and with the personality that will claim the attention of the students. The ability of the teacher to present his subject so that his students are interested in their work, and so they will comprehend the value of the subject matter is essential to successful teaching. It is not sufficient to merely teach the student how to perform the operation, but why the operation is performed. The methods should be presented in such a manner as will stimulate thought so that the student's reasoning faculties may be developed along with the development of his skill and dexterity. If the teacher is enthusiastic over his subject and impressed with what he is teaching, then that teaching must be forceful and will impart interest and enthusiasm to his class so it will not be necessary to force the students to attend the lectures by roll calls, etc., as is sometimes resorted to by those who are unable to stimulate the interest of the student which is important to the successful teaching of any subject. A teacher should be a man of character for in his individuality he has a wonderful power over his students. I know of nothing that gives a teacher so much command and influence over his class as enthusiasm, personality and power of thought. After the student becomes interested in this work, by beginning with the more simple phases of it, he will easily and understandingly progress to the more complex.

I was in hopes the essayist would tell us his method of teaching the students how to obtain the proper colors. You will all quite agree with me when I say that the color proposition is the most difficult problem with which we have to contend in the application of porcelain. I believe the student should receive a very thorough course on the subject of light before taking up the color problems in this work. For this part of the course I am using a little work entitled "Light for Students" published by McMillen & Co. of New York which I have found very valuable and which covers the subject of light in a very comprehensive manner.

We have adopted Dr. J. Q. Byram's method for teaching the phenomena of color. After giving a through course on the subject of light, we take up the distinction between transparent translucent, and opaque bodies and show the power of pigments to transmit, reflect and absorb light by illustrating with these factors. We take up the study of the various pigments used in the manufacture of dental porcelain and the colors produced by each. The first technique work is done by water colors. Each student is required to purchase a water color outfit of the three primary colors, red, yellow and blue and a drawing book . They are first instructed to show the variations of color produced by decreasing the thickness of the layer of pigment upon the paper. Then they are taught to combine the primary colors to make the secondary colors, mixing the colors, in varying proportions showing the different hues.

After experimenting with water colors a series of experiments is carried on with porcelain bodies, showing the effect the thickness of the layer has upon color, and also the effect that is produced by combining two or more colors in layers. We emphasize the fact that porcelain is employed chiefly for its aesthetic value and if an operation in porcelain is to meet the requirements for which it is used, the color must be as near perfect as possible.

In closing I wish to say, we can not be too careful in impressing the students with the necessity of being conservative and judicious in the application of porcelain; to emphasize the fact that it is not the ideal material that can be used indiscriminately, but it is only one of the many good materials we have at our command, and common sense and discretion should prevail in its application.

Dr. Patterson,
Kansas City.

I have been very much interested in the very able discussion of this subject. Many of the suggestions have been very admirable and some of them very new to me. I have only one point that I desire to speak about, and that is the reference made by one of the persons discussing the first paper. I think Dr. Randall when he spoke of the silicate cements, or the so-called enamels, and he referred to Asher's, and said that the silicate cements would revolutionize the filling of teeth in the anterior part of the mouth; and whether it will or not. I think it is the duty of the teachers to find out, report, and make possible the field for the silicate cements. I think we can do that better than to have it done in a discursory way all over the country. I have friends who have been using the material for five years. I have seen one filling that has been in for three years and a half. Many have used it successfully for two years. I have been using it for nearly a year, and I think I am doing the proper thing when I tell you I am tabulating and keeping track of every filling which I insert for patients I know well and who will return to me, and I believe by the time of the meeting next year I can give a very fair opinion of the material, or the field there is for the cements. I am giving it a thorough test, and I believe all the members of this Institute should do likewise, because I am not going to depend on what any man tells me regarding these new filling materials. There is something in them. There is no question at all about that, and with the records I am keeping I think I will know, if not next year, within two or three years, the field that they are going to occupy, and if they do prove satisfactory they are going to change a great deal of our teaching and a great deal of our work.

Dr. Byram,
Indianapolis.

I have been very much interested, of course, in this subject, and I wish to compliment Dr. Fickes upon this very valuable paper. Dr. Fickes and I have been working hand in hand for three years, and I know well of the good work that he is doing in the institution which he represents. I assure you it is a great pleasure to be permitted to say a few words upon this paper.

As I remarked yesterday, it is a serious proposition to know just how much of a special subject to give. Those of us who teach porcelain work can appreciate the peculiar position in which we are placed. In order that a student may master the porcelain art, he must be as skilled, or even more skilled, than in any other branch of dentistry; and in order that he may master this art, he must acquire probably more appreciation of the artistic sense than is required in any other part of dentistry. So you see the position in which we are placed. We can lecture upon certain things as the mechanical principles, and if we stop there our students will go out and be just like those of us who blindly took up porcelain work a few years ago, and to me it is a serious problem. When I presented to this institute last year a course in water colors it was ridiculed by many members, but I am happy to say that a number of institutions have taken hold of that course, and I hope the day is not far distant when every institution trying to teach Dental Ceramics will begin at the right end. As Dr. Fickes and Dr. Lyons have said, we cannot teach them the principles of color until they have some knowledge of the phenomena of colors, and until they obtain this knowledge you may stand up there on the platform and tell them how to do these things, and they forget it faster than you can tell it to them. Why this Technic course in different lines? It is to impress upon the students that which we are giving them in a didactic way, if I understand the principle of scientific technology. As far as it is possible to do, technic operations should follow the instruction. I try to arrange my course, as far as it is possible, so that all of my technic work will follow the lectures, and I believe that by this system students obtain more good by doing so. It is not a mere fact of assigning a certain amount of technic work at the beginning of the year in order that I may fill in, but the course is strung out and arranged so that it is carried throughout the year, and my seniors will be doing technic porcelain to within a month of graduation. Of course, there will be certain phases of the work that will not be taken up at all. I try to impress upon my students, even though I am enthusiastic upon this particular branch, that it is only one of the many filling materials, and that it is to take its place with the other materials, and not replace them.

A VOICE: I am glad to see that point brought out.

Dr. BYRAM: If I may say just a word in regard to the Silicate Cements, I wish to refer you to an article in the DENTAL ERA, by Dr. George Edwin Hunt. He has carried on quite extensive experiments with the Silicate Cements, and it is interesting to read this article. I can tell you where not to use the silicate cements better than I can tell you where to use them. I have used them in all forms of cavities in order that I might study them. I do not use them in cases where there is stress. I have restored a portion of a proximo-incisal angle with the Silicate Cements and I find them lacking in edge strength. In another case, the proximo-occlusal surface of a bicuspid was built up where there is no stress and these fillings are in good shape. But in other approxmo-occlusal fillings where there is stress, I can notice a wearing of the margins, and I have noticed in many of the Silicate Cement fillings that there is a line of demarcation along the margins that is as prominent as that of a well-constructed porcelain inlay. Dr. Hunt's experiments led him to believe that all Silicate fillings shrink, and, if that be true, I think it explains why we have these lines of demarcation.

I agree with Dr. Patterson that we should test these things for ourselves, and as I tell my students, I hail the day when we can get a plastic material that will take the place of porcelain. But until we get that, I believe that porcelain should have its place.

Dr. Fickes,
Pittsburg, Pa.

In Dr. Randall's remarks there was one point of which I wish to speak, and at the same time I will speak of the subject of Dr. Patterson's remark, that is in regard to Silicate Cements. In the first place, these cements are not to be included under porcelain, and, in the second place, they do not appertain to the subject of the paper. I wish to say, however, that they have no place in my practice. I believe that I have tested them thoroughly, having bought every one that I have heard of, and having given each a thorough test; and to-day they have no place in my practice, because where they can be used, porcelain is indicated, and porcelain is the better of the two materials, and where porcelain is not indicated, something else is preferable to the Silicate Cements.

However, I find it impossible to make a good porcelain worker out of every student, and, I have no doubt, the Silicate Cements will be useful to some of them.

Dr. Buell spoke of manual dexterity as one of the desirable attributes. That is one of the ends to be accomplished—one of the indespensibles. He mentioned several methods of teaching which are well worth adopting, the one in regard to the use of sand being a specially good idea.

Dr Lyons spoke of the arrangement of the subjects. The best method must conform to the arrangement of the other subjects in the curriculum.

The method of teaching colors was not explained in detail because it would have made the paper too long. However, I will say that we are teaching colors to the best of our ability, and consider it one of the most important parts of a porcelain course.

I am in perfect accord with Dr. Byram in regard to his remarks on the Silicate Cements. I do not think they have any edge strength, at least I never succeeded in mixing them so that they had edge strength.

Porcelain is very brittle if it is over-fused. I believe we can approach the strength of artificial teeth with porcelains which fuse between 2,200 and 2,500 F. I have been surprised at the strength developed by baking a much longer time than is usually devoted to the fusing of inlays and crowns.

I thank you very much for your kind attention.

THE DIDACTIC TEACHING OF DENTAL ANATOMY, HISTOLOGY AND EMBRYOLOGY.

BY CARL D. LUCAS, D.D.S., INDIANAPOLIS, IND.

The methods of teaching the above subjects have been greatly simplified by the systematic descriptions of the parts, and the arrangement of outline in Dr. I. Norman Broomell's "Anatomy and Histology of the Mouth and Teeth," in which a complete description of one part is given before another part is taken up. By using this work as a text-book, recitation teaching is possible, a method considered by many as the best to instil into the mind of the student the details of the subject.

In presenting the work in anatomy before the class, the first step is to give a general description of the buccal orifice, the lateral walls of the mouth, the hard palate, the soft palate, the fauces, the floor of the mouth, and the tongue and its attached muscles.

In all the work in anatomy, the student should be instructed to study the text, and follow it by comparison with his own tissues, using the hand mirror. In other words, he should be taught, so far as is possible, to examine the anatomy of his own head and face. and to learn the text by comparison, not alone by committing the subject to memory. By following his text-book, he can outline the muscles of the lips and cheeks, and the muscles of mastication, and before the mirror, demonstrate their action. In this manner, he learns by observation, not merely in the abstract.

A minute description, using disassociated bones, should be given, illustrating the surfaces, processes, fossae, and foramina of the superior maxillary and palate bones, demonstrating the cavities formed by their articulation.

By the use of a disassociated superior maxillary bone, the description of the maxillary sinus, or Antrum of Highmore, should be given, showing its location in the body of the bone, the septa in the floor of the cavity, and the relative thickness of its lateral walls.

Reference should be made to the methods of operation employed for securing drainage of the sinus when in a diseased condition. The articulation of these bones with their associated bones, and the contour of the hard palate in the four basilar temperaments, should be taught by demonstration, using the articulated skull. For teaching the distinctive outlines of the four basilar temperaments, diagrammatic drawings are practical, illustrating the high, flat arch of the bilious temperament, the parabolic arch of the nervous, the graceful, segmental arch of the sanguine, and the low, irregular arch of the lymphatic temperament.

By use of the inferior maxilla, the bodies, processes, surfaces, foramina and fossae, described in the text, can be demonstrated before the class. The alveoli of the superior and inferior maxillae should be separately described, comparing the relative thickness of the alveolar plates of each jaw. In this connection should be demonstrated the theoretical direction of the physical force applied for the extraction of each tooth.

The six centers of ossification of the inferior maxilla; viz, mental, dentinary, coronoid, condoloid, angular and splenic, and the four centers of ossification of the superior maxilla; viz, the pre-maxillary, maxillary, malar and pre-palatal, should be located for the student on the disassociated bones. The development of these bones should be followed from the eighth fetal week to the eruption of the permanent teeth. Because of its articulation with the superior maxillary bone, the center of ossification of the palate bone should be illustrated, and its development detailed.

Using the disassociated bone, the anatomical outlines for the origin and insertion of the muscles of the lips, cheeks, and muscles of mastication can be demonstrated before the class, all the while keeping prominently before the student the practical side of their physiological functional activity, as compared with the text. Using the articulated skull, the action of the muscles of mastication and the relative position of the maxillary bones can be demonstrated showing the physical principles brought to bear in the action of mastication, referring to the leverage and power exerted in this physiological act

The student should be required to make drawings to demonstrate the attachment of the ligaments which hold the temporo-maxillary articulation in place. A number of these drawings, clearly showing the attachment of the ligaments, may be used in the lecture room. By the execution of these drawings, the student has more firmly fixed in his mind the anatomical arrangement of the ligaments, and has become familiar with the physical forces which they resist.

A general description of the teeth should then occupy the attention of the student, with reference to their classification, surfaces, position in the dental arches, and the number and shape of the roots. Papier mache models of each of the permanent teeth, prepared by Dr. Thomas E. Weeks, formerely of Minneapolis, now of New York, are valuable adjuncts to demonstrations in lectures. The comparative contour of the teeth, showing the temperamental characteristics in the four basilar temperaments, should here be studied. The student should be reminded that these temperamental markings on the teeth correspond to the general outlines to be seen in the roof of the mouth, the shape of the dental arches, and the outline of the gingivae in the same temperaments. Subsequently the occlusion of the teeth should be considered, showing the arrangement of a typical occlusion, by a drawing which illustrates the occlusal contact of the different tooth planes of the superior teeth with those of the inferior teeth. The differentiation between occlusion and articulation of the teeth should be made, occlusion referring to the stationary position of the teeth of superior and inferior arches when they are held together by the muscles of mastication, and articulation of the teeth signifying the gliding of the occlusal surfaces of the inferior teeth over the occlusal surfaces of the superior teeth during mastication. This is best demonstrated by the articulated skull.

The blood and nerve supply to the teeth should next be taken up. This work can be satisfactorily presented before the class in a series of drawings prepared by the student. The first of the series is one showing, schematically, the blood supply to the parts. This arrangement shows the internal maxillary division of the external carotid artery and its branches; viz., the external and internal pterygoid, masseteric, anterior and posterior deep temporal, spheno-palatine, posterior, or decending palatine, naso-palatine, vidian, infraorbital, labial, posterior dental, anterior dental, buccal, inferior dental, incisive, and mylo-hyoidean.

The second of the series shows the branches of the anterior and posterior dental, and the inferior dental arteries to the individual teeth.

The third of the series illustrates, schematically, the nerve supply, showing the divisions of the fifth cranial, or the trigeminal; viz: the first, or opthalmic, the second, or superior maxillary, and the third, or inferior maxillary division.

The fourth of the series shows the distribution of the second, or superior maxillary, and the third, or inferior maxillary divisions to the individual teeth.

By means of these charts, the student is able to follow the lecturer very closely by the work being illustrated as lectured. This work can be further demonstrated by the use of an inferior maxillary bone which has the outer alveolar plate dissected away, the sixteen teeth being held in place by sticky wax, and the nerve and blood supply outlined by red, blue and white threads. The red threads indicate the arterial supply, the blue, the venous supply, and the white, the nerve supply to the individual teeth.

A general description of the gums should be given, with reference to their substance, texture, contour, covering, and attachment to the periosteum covering the alveolar plates, and their gingival margins, which are closely moulded to the necks of the teeth. It should be explained that the mucous covering of the gums in the labial and buccal regions is continuous with that of the lips and cheeks, while the mucous covering of the lingual side of the superior gums is continuous with that of the hard palate. The lingual mucous covering of the lower gums is deflected from that of the floor of the mouth. The outline of the gingival margins of the gums designates the temperament of the individual, and corresponds to the temperamental outlines of the hard palate and the dental arches. The gums are attached to the periosteum covering the alveoli and to the pericemental membrane at the cervical line where the fibers of alveolar periosteum interlace with the fibers of the pericemental membrane. The gums are attached to the muscular tissues by the frena of the mouth; viz: frenum labium superioris, frenum labium inferioris, frenum linguae, and the buccal frena.

Consideration of membranes, in a general sense, should next be taken up. The term membrane, generally speaking, is one applied to thin layers of tissue, somewhat elastic, and of a whitish or reddish color. Membranes are found lining closed cavities, enveloping certain organs, and lining canals which open externally. They absorb, or secrete, fluids. Simple membranes are of three varieties, mucous, serous and fibrous. Mucous membranes are so-called from the clear, viscid fluid—mucous—which they secrete. They are found lining cavities or canals of the body which communicate exteriorally. Mucous membranes are divided into three grand divisions lining the digestive, respiratory, and genito-urinary tracts. The beginning of the digestive tract is at the contiguous surfaces of the lips.

A general consideration of the mucous glands should next be taken up. The labial mucous glands are found beneath the mucous membrane of the lips, communicating exteriorally by short ducts from the glands through the mocous membrane to its surface. The buccal mucous glands are found beneath the mucous membrane of the cheeks, communicating exeriorally in the same manner. The palatal mucous glands are located in cup-shaped depressions, which are visible on the oral surfaces of the palatal processes of the superior maxillary bones. They are situated between the mucous membrane and the periosteal covering of the palatal process, and communicate exeriorally by short ducts which pass through the mucous membrane to its oral surface.

Mucous glands are found beneath the mucous membrane of the soft palate, and beneath the mucous membrane of the dorsal surface of the tongue.

The salivary glands are without the mouth, but their secretion is closely associated with the functions performed within the oral cavity. They are the parotid, a true serous gland, sub-maxillary, a mixed mucous and serous, and the sub-lingual, a true mucous gland.

The location, structure, lobes and ducts of these glands should be outlined before the class.

The function and structure of the pericemental membrane should be taught in minute detail. Drawings to show the relative thickness, direction of fibers, and distribution of blood vessels and nerves, should be used in this connection. The importance of preserving the membrane intact at the cervical line in the adjustment of mechanical substitutes for natural teeth should be impressed upon the student, showing the necessity for preserving the physiological function of the membrane.

A minute description of the separate teeth is greatly facilitated by the use of Week's papier mache tooth forms previously mentioned. All of the anatomical markings are fairly well outlined upon these tooth forms. The time and extent of calcification, the eruption, the average measurements, the surfaces, ridges, angles, fossae, grooves, and cervical lines, occlusal surface, cusps, and incisal edges should be described in detail.

The location and direction of the pulp canals of each tooth should be very concisely described, and it should be rigidly impressed upon the student's mind that when operating upon the pulps of teeth, or treating abscessed teeth, it is absolutely necessery, in every case, to secure good access to the orifices of these canals, even at a great sacrifice of good tooth substance. The operator should know exactly how many pulp canals there are in each tooth and where they are located. In his operations, he should spare no time in trying to locate all of these canals. In this connection, he should be instructed as to the danger of losing the organs by perforation of the bifurcation or trifurcation of the roots.

The arrangement of the deciduous teeth, their occlusion, extent of calcification at certain periods of time after eruption, their decalcification, shedding process, ridges, measurements, surfaces, grooves, fossae, and pulp cavities should be taught by recitation. In this connection, the skull of a child, between the ages of five and six, prepared by Ward, is very valuable. In this specimen, the outer alveolar plates are dissected away, showing the extent of root resorption of the erupted temporary teeth, and the location of the forming permanent teeth in the crypts, with the soft parts of the permanent tooth follicle dissolved out, leaving the forming crowns of the permanent teeth in position.

The embryological development of the teeth from the heaping up of the surface epithelium, and the dipping of the deep epithelium in the direction of the future alveolar walls, to the calcification and eruption of the teeth should be lectured upon and demonstrated before the class by drawings and models. Colored wax models, imported by Charles H. Ward. 45 Mount Hope Avenue, Rochester, N. Y., showing the growth of the tooth germ, are of special value.

Each of these models represents a dissection of the mucous membrane from the hard palate, inverted to show the deep epithelial tissues, and the primitive tooth band, with the enamel organs attached, in various stages of development.

The first of this series of six models, illustrates the heaping up of the surface epithelium, and the dipping in of the deep epithelial layer, forming the primitive tooth band.

The second of the series illustrates a further development of the tooth band, with the secondary lamella outlined on its lingual surface, showing the location of the tooth buds from which the enamel organs for the future deciduous teeth are developed.

The third model shows a further growth of the tooth buds into the connective tissue, with the hood-shaped enamel organs for the ten superior deciduous teeth fairly well developed.

The fourth of the series shows the enamel organs for the central lateral, cuspid, and two molars, with the impressions, formed within the enamel organs by the dentin papillae, representing the contour of the dentinal portion of the future crowns.

The fifth shows the enamel organs for the central and lateral incisors in the follicular stage, indicating, in colors, the extent of deposition of enamel and dentin, with the pulp cavities outlined.

The sixth of the series represents a section through the papilla of the second deciduous molar in the follicular stage, outlining in colors the extent of the deposition of enamel and dentin, and the contour of the pulp cavity. This model also shows the attachment of the germ for the first permanent molar to the extention, distally, of the primitive epithelial tooth band.

After a careful and concise consideration of the subject, by use of these models for demonstration, a summary of the embryological development is made practical by the use of a series of slides for the projectoscope. These slides follow illustrations in "Broomell's Anatomy and Histology of the Mouth and Teeth," and are prepared by Williams, Brown and Earle, Tenth and Chestnut Streets, Philadelphia. While they are being projected upon the screen, different stages in the development of the tooth germ can be pointed out.

Histological laboratory work should supplement the didactic work upon the subject. Didactic work in the class upon general histology can be brought out by the quiz method, first, taking up the tissues of the body; viz, epithelial, connective, muscular, and nervous tissues, in a general consideration; then the histological structure of the mucous membrane of the lips, cheeks, and gums, roof of the mouth, soft palate, floor of the mouth, and tongue.

Following this, take up the histological structure of the glands of the lips, cheeks, hard and soft palate, tongue and salivary glands, their nerve and blood supply and ducts. By the same method, should be taught the histological stucture of the muscular tissues of the lips, cheeks, soft palate, and tongue.

Finally the histological arrangement and structure of the tissues of the teeth, should be taught, with reference to the direction of the enamel prisms, and their resistance to cleavage in the preparation of cavity margins.

The chemical composition of enamel, and the slight variation in density, occurring in the enamel of different individuals, should be considered. These essential differences are regulated by the proportionate quantity of calcium phosphate and carbonate, a greater amount of phosphate being productive of additional hardness, while an increase of calcium carbonate beyond the minimum amount decreases the hardness.

A general consideration should be given to the brownish colored striae of Retzius, which run parallel to the surface of the enamel, outlining the stratifications of the primary deposits.

There should also be described still another set of lines, which are observed in the substance of sections of enamel. These are called the Lines of Schreger, and are due to the various directions assumed by the contiguous groups of enamel rods.

The histological consideration of dentin should follow, describing the matrix, dentinal tubules, dentinal sheaths, and dentinal fibers, and the interglobular spaces.

By diagrammatic drawings upon the board, the ecdermic development of enamel, and the endermic development of dentin, can be clearly presented.

It should be explained that the development of enamel is a secretive process, while the development of dentin is an excretive one.

The histological structure and the development of the cementum should be taken up, showing that it, like ordinary bone, consists of a gelatinous basis substance, combined with salts of lime, containing numerous hollow spaces, the lacunae. Branching in every direction from the lacunae, are minute processes, the caniliculae. It should be explained that cementum calcification results from a layer of cementoblasts, located in the inner layer of the follicular sac. In the histological consideration of the pulp tissue, or the formative organ of the dentin, it should be described as a mucous-like, protoplasmic matrix, containing delicate connective tissue fibers, not formed into bundles, and numerous nucleated cells, the latter being especially numerous on the periphery of the pulp, or that portion which comes in contact with the dentin. In general, the cells are elongated, or spindle shaped, with delicate hair-like processes attached to their extremity. The most active cells of the pulp are those in contact with the dentin, and are known as the odontoblasts. The odontoblastic layer, otherwise known as membrana eboris, is composed of a single row of cells, each of which contains a well defined nucleus in its bulbous portion. They are large, elongated cells, each furnished with three sets of fibers, or processes—the dentinal, pulpal and lateral processes. It should be explained that the pulpal processes of the odontoblasts communicate with the cells of the pulp tissue enclosed by the odontoblastic layer. The lateral processes serve as a means of communication with neighboring cells.

The dentinal processes are given off in the direction of the dentin, tapering as they enter the tubules.

Reference to the blood supply of the pulp should be given. It is richly supplied with blood vessels forming networks. The vessels extend in a direction parallel to the long axis of the tooth, and finally terminate in a capillary plexus closely associated with the odontoblastic layer. The veins are ordinarily larger than the arteries of the pulp and anastomose frequently. There are no lymphatics in the pulpal tissue. The walls of the blood vessels are very delicate.

The divisions of the nervous tissue after it enters the apical extremity should be described. The fibers from the large trunk entering the apical foramen pursue a parallel course to the walls of the pulp canal, where the fibers remain intact. When the coronal portion of the pulp is reached, the fibers subdivide and are distributed in every direction, ending in a rich plexus beneath and around the cells of the odontoblastic layer.

It should be explained that in the body of the pulp the fibers are medullated, while the peripheral twigs are non-medullated, and are thought to pass into the dentinal tubes.

The histology and origin of Nasmyth's membrane should be given. It is otherwise called the enamel cuticule, or persistent dentinal capsule. It is an extremely thin and peculiarly indestructible structure entirely covering the enamel. By a change in the character and form of the cells of the external epithelial layer of the enamel organ, the membrane is generated. Nasmyth's membrane serves as an indestructible, highly polished surface-capping of the enamel prisms.

The histological character of the pericemental membrane should next occupy the attention of the class. This may be accomplished by referring to its duties, which are divided into three classes —functional, physical and sensory. The functional duty is performed by the cellular elements—the osteoblasts and cementoblasts; the physical office is performed by the fibrous elements by which the root is fixed in the socket; the sensory office, through the abundance of nerves which are distributed to all parts of the membrane. It is composed of connective tissue, cells, fibers, nerves and blood vessels.

The osteoblasts are found lying against the bone, and are bone builders. They are polygonal cells, of varying size. The arrangement of these cells during the process of bone building, and their change of shape and size at different periods of life of the cell should be described.

Histological consideration should be given to the cementoblasts, cementum builders, found in contact with the root, the fibroblasts, fibrous tissue builders, and the cementoclasts and the osteoclasts, or giant cells. The osteoclasts are functionally concerned in the removal of alveolar process when teeth are moved, and the cementoclasts in the resorption of the roots of the deciduous teeth.

The attachment of the fibers of the pericemental membrane to the bone and the cementum of the tooth should be taught. The fibers pass directly into the hard tissues which they traverse for some distance, being known here as Sharpey's fibers.

This, in brief, embraces a course in these subjects, which may be elaborated to the great benefit of the student. The subjects are at best difficult to make attractive and interesting, requiring some ingenuity on the part of the teacher to make them clear. However, with patience, and with the various teaching models, drawings and appliances previously mentioned, much may be accomplished.

DISCUSSION.

Dr. Wm. Bebb,
Los Angeles.

As a teacher of Comparative Odontology and not the branches presented by Dr. Lucas, necessarily what I have to say, regarding a subject upon which I have little information, will be foreign to the essay.

It appeals to me that Dr. Lucas has outlined an admirable scheme for the instruction of the student in the subjects named and I find little that calls for criticism.

I especially commend what he has to say regarding the value of models and drawings as an adjunct to didactic teaching. These together with the aid of the projection lantern are invaluable, and serve to impress upon the mind of the student facts, which might be overlooked, where text-books and lectures alone are resorted to.

In connection with the subjects named it is to the advantage of the student to be possessed of some knowledge of the corresponding tissues as found in the other animals and also the plants. To that end Comparative Odontology becomes a valuable adjunct. A comprehensive understanding of the latter necessitates colateral reading, and while I have never demanded it, nevertheless I believe that we would be justified in requiring our classes to do more outside reading. This custom is followed in most colleges of higher education, and there is no reason why we should not follow their example. The proof that the student had done this work would be to exact a thesis upon the books read.

These should be books easy of reading and comprehensive to the average student. The following are a few which I would present.

Dental Anatomy.—Tomes.

Animals.—Jordan Kellogg & Heath.

Plants.—Coulter.

The color of animals.—Poulton.

Organic Evolution.—Metcalf.

The collection, careful mounting and labelling of specimens should be urged upon the student. Typical and atypical specimens of teeth from the dentition of man and other animals, human and animal crania, histological slides, etc., are to be valued. No one can make a collection without becoming somewhat of a student of the same and it is students our profession is most sadly in need of.

As a criticism I would say that I am not quite sure, that in several instances, the essayist has not reached beyond the bounds of the subject in hand and trespassed upon the domains of the chairs of Anatomy and Physiology. We all appreciate the difficulty of teaching closely related subjects without encroachment, but in this day of specialization it should be our aim to know one thing and know it well and ever be on our guard to avoid trespassing on other chairs doubtless filled by men better able to teach their branch than we are. It is necessary for us to familiarize ourselves with the allied subjects which have a bearing on our speciality, but in our teaching to confine ourselves strictly to the one subject in hand.

In closing, if I may be permitted a digression I would like to say that I doubt the advisability of placing much emphasis in our teachings upon the basilar temperaments.

I am unable to find that the Medical profession make any use of the classification. In a general way we doubtless have some justification for the belief that the hair, nails and teeth, derived from the same dermal layer, possess characters not altogether dissimilar, and while the arrangement doubtless has some value from a psychological stand point, it is questionable from an anatomical point of view, whether it has any bearing whatsoever. It appeals to me that this is an attempt to reduce the human equation to a system of definite set rules. A proposition extremely doubtful of accomplishment.

In this country we have a mixture of races and types brought about by the inter-marriages of different nationalities, accompanied by the variations to which all organic beings are subject, which has wrought well nigh hopeless confusion.

Dr. Frederick B. Noyes, Chicago. In discussing this paper I shall consider it as a recommendation of an outline for a course of instruction, but before taking up the paper I feel that it is necessary to say a little about dental education in general.

The course of dental education up to the present time has been the superficial character of the teaching of all the fundamental sciences. There have been many factors which have figured as causes for this condition and time will not allow of their consideration. This lack of education in the fundamental sciences is the greatest incubus upon the profession at the present time. It is a fact that the graduates of our best dental colleges are not well enough grounded in chemistry, physics, anatomy, physiology, pathology and histology, to make them available for any line of original investigation or special study. It is only a corolary of this proposition to say that the profession is not well enough informed on these subjects to make the results of original work intelligible to them or useful in their practice. I fully believe that great forward steps for the profession are now waiting the time when the members of the profession shall be well enough grounded in these subjects to allow them to attack the new fields of truth which are waiting. The study of liability and immunity to caries, pyorrhoea and erosion have certainly led us to the point where it is apparent that these subjects are at least associated with the metabolism of the cells of the bodily tissues. Further progress in these fields, I believe is not to be looked for until the profession is well enough grounded in histology and physiological chemistry to intelligently study general metabolism. This should be the very strongest plea for the better teachings of the fundamental sciences in the dental schools.

To return to the paper, the author deals with didactic teaching of anatomy, histology and embryology. It is true he urges laboratory teaching in connection with it, but his idea seems to be to make the laboratory teaching supplementary, which I believe is a wrong view. These subjects are the study of things and phenomena that can be seen and handled and the very best way to know them is to get hold of them, look at, and study them. A student can learn more about the progress of inflammation by pricking the web of a frog's foot with a red hot needle, and observing the inflammatory changes in the circulation, than by reading volums on the subject. It is true that the reading will supplement what he can see for himself, but the observation is the key which allows him to interpret what he reads; having made one-observation, the discription of other observation are intelligable to him, and give him clear conceptions of conditions which otherwise would be meaningless, because there was nothing in his experiences to furnish comparison.

A student who had never studied chemistry might be given a lecture course in organic chemistry illustrated with charts and models. He might learn the formulas of all compounds, and all the typical reactions, but when he is through he will have filled his memory with a lot of meaningless lumber. The first thing that must be gained in the study of chemistry is the atomic and molecular composition of matter and the laws of atomic and molecular attraction, without which chemical formulas are meaningless. The author says that it is difficult to interest the student; of course it is, if the course as outlined is given to the student not already thoroughly grounded in general anatomy, histology and embryology, for you are describing tissues in terms of cells to students who do not know a cell from a load of hay. One might as well attempt to give a Hotentot or a South Sea Islander, an idea of a locomotive, and the differences between the mountain climbers of the Pennsylvania road and the great engines of the Chicago & Alton, by descriptions in words, for the locomotive is less foreign to the experience of the savage than is the microscopic structure of the cell to the freshman dental student. If the course could be given as an advanced course to students already familiar with the subjects, it could easily be made very valuable, but even in that case it seems to me that it should be divided into at least these subjects. I have divided the outline into about twenty headings which follow each other without any other logical reason, than contiguity. For instance, the calcification and absorption of the temporary teeth is placed before the embrology of the tooth germ. In fact, my greatest criticism of the paper, as well as the text-book advised, is the lack of system in the arrangement of the material. Things are put together which do not belong together, and matters are discussed which cannot properly be understood without a knowledge of subjects which are discussed later. A result of such training must be superficial. In closing I may perhaps be allowed to give a very brief outline of the plans which I believe should be followed in teaching these subjects and placing them in the dental curriculum.

First; there are two sides to dental education (which is the greatest source of our troubles as teachers) the practical, or the technical, and the fundamental or scientific. These must develop hand in hand if dentistry is to claim its own as a profession. It requires time to develop finger skill, therefore the technical work must begin in the first year. It also requires time for new points of view to be established, therefore the fundamental sciences should be taught in the first year, and the special applications of them in the second and third year. The purpose of the first year might be stated, I believe, as follows: To reconstruct the conceptions of the body in terms of organs, tissues, cells and intercellular substances. To re-organize bodily functions under the function of organs and cells. To analize matter into atom and molecule, and material change into chemical action. To obtain a detailed knowledge of the anatomy of the human teeth and develop the finger skill by preforming operative and prosthetic proceedures upon dummies. During freshman year then, should be taught general anatomy, beginning with osteology, the didactic teaching should be accompanied with the dissecting-room work as closely as possible.

The anatomy of the human teeth should be taught in the Operative Technique course, by carving the teeth in ivory and filing down teeth for a study of the pulp chambers and root canals. A student should not be satisfied with his knowledge of dental anatomy until he can reproduce any tooth perfectly from memory. The histological course should begin with the handling of the microscope; The study of pond and ditch biology as an introduction to cell structure, cell division, and the activity of protoplasm. This should be followed by the formation of tissues; the study of the elementary tissues and the histology of the organs of the skelatol, circulatary, alimentary, respiratory and excretory systems. The purpose of the course should be to reconstruct the student's idea of the structure of the body in terms of vital unity or cells and their products or intercellular substances. This is as much as can be done in a year's time.

In the second year should be given the special anatomy of the head and neck, and no student should be admitted to it until he has the knowledge of general anatomy and the experience in dissection gained in the first's years study. He has learned to recognize organs and tissues in the dissection and is prepared to gain more from the work on the head. The work should be not only on the cadaver, but as the author says, from living subjects and knowledge should be tested by drawings from memory. A third course in the senior year of surgical anatomy consisting of operations performed upon a cadaver would be of great value. The special histology or dental histology should be given in the second year, and no student should be admitted to it until the course in general histology was completed, for he should have the microscopic technique, and training in microscopic interpretation, as well as the ability to recognize tissues derived from the first year's work. I will not outline the course but it should be followed by a course in embryology, which if it is to be of any value must begin with maturation, fertilization, segmentation and the formation of the germ layers. The development of the embyro, and the formation of the nose and mouth cavities, followed by the development of the tooth germs, the growth of the jaws, dentition and the development of the face.

My contention is that it requires time to gain new points of view. That the general idea of the structures of living things must be gained in the general courses of anatomy and histology, and then these general ideas must be brought to the study of the special parts of the subject especially of interest to the dentists, as the medical student studies first anatomy and then surgical anatomy. I believe it would be much better to give a good course on mammalian anatomy with through dissections of dogs, followed by a thorough course on the head and neck over the cadaver, than a slipshod dissection on the entire cadaver. In all these subjects didactic work must supplement laboratory work, and true ideas of microscopic objects cannot be given from microscopic models alone. In the study of living things nothing can take the place of living things and the basis for the treatment of disease is a knowledge of the mechanism of life.

Dr. Chas. L. Babcock,
Milwaukee.

Dr. Lucas' paper deals with a very important section of dental education; a section in which instruction has in the past been sadly deficient, and even now in most colleges is not given the full consideration its importance demands. The essayist has covered the field in such a thorough and systematic way that I find much to commend but very little to criticize.

The title of the paper seems a little misleading, or have I been giving to Dental Anatomy a too limited definition? The paper deals with what was formerly, at least, termed Regional Anatomy. The paper gives no suggestion as to the amount of work in the general subjects of Anatomy, Histology and Embryology the student is supposed to have done before taking up the work as outlined nor as to the position this work is to occupy in the curriculum.

This seems to me important, as perhaps the most perplexing problem I have encountered is that of arranging the courses of study so that the student progresses by regular connected stages from the general knowledge, which forms his conception of the subjects studied and balances his judgment, to the minute and particular information which he must use in his every day work. A word from Dr. Lucas as to where and how in his judgment this work which he has outlined would best fit into the course of instruction would have been welcomed by me. The essayist refers more than once to the four basilar temperaments. My knowledge of the subject does not enable me to discuss with any degree of confidence, the indications of temperament as shown by the conformation of the dental arches and the arrangement of the teeth. It occurs to me, however, that what might be taken as a typical example of one of the so-called basilar temperaments could easily be in reality the result of arrest of development, or of some other etiological factor of irregularity.

The essayist seems to favor the recitation method and the use of a text-book. This is well up to a certain point, but with a large class, and in subjects requiring as much in the way of explanation and illustration as does the matter under discussion, the lecture method seems to me to offer the best means of utilizing the illustrative material, and in this way, securing the attention and interest of the class. There are many ways of illustrating and demonstrating the subject suggested in the paper, all of which are good. He does not mention the modeling and carving of teeth, which of course comes more in the technic line, but which I believe to be one of the most effective ways by which to fix indelibly in the student's mind the outlines of the teeth.

The points which I find to criticize are so over-shadowed by those which I find to commend and which are apparent to all who read the paper that I will not burden you with longer discussion.

The paper is an inspiration and encouragement to all engaged in dental educational work because it marks important advance and improvement in the teaching of these most important subjects.

Dr. D. M. Cattell, Nashville. There were so many things that occurred to my mind as the paper was being read and the discussions were going on, that it would take a long time to say all the things I would like to say, but I do wish to compliment the author on the production of that paper before this body. This is the first thing if my memory serves me right, that he has presented, he is one of the younger men, and yet he has done the work nobly. The commendations that I might make would be numerous; the criticisms but few, and the only one of importance, it seems to me, is that he oversteps the bondary line of what we might call **Dental** Anatomy, and that this could be taught by other teachers to better advantage. It seems to me that a part of this should not be covered by this chair.

I am exceedingly proud of two of the papers that were presented here for discussion. They are both, if you will permit me to say, from students of mine; that is, I have been one of their many teachers. Dr. Bebb was a student under me in Chicago, and he has been doing most noble work in southern California for the last few years; Dr. Noyes, I believe, to-day is the greatest Histologist and Embryologist that we have in the Dental profession. I do not believe there is any doubt of that. He has been an indefatigable worker, and he is so quiet and so modest that many do not know him yet, but the actual work that he has done surpasses any that we have ever had. Older men have been working, but they have not done the work that that little man has done in Chicago, and the systematic efforts that he has put forth are shown in his paper and in the few remarks that he has made on the original paper. He has a better system in his course of instruction than any other I know of.

On the whole I believe this is a very fine paper presented to us by Dr. Lucas; it is the only of the kind I remember of since Dr. Noyes gave us a paper a few years ago on the subject of Histology and how to teach it. I want to compliment the writer once more. I did not know that the young and quiet looking teacher had so much in him.

Dr. C. D. Lucas, Indianapolis. I do not have much to say in closing the discussion, but I wish to thank Dr. Cattell for his consideration. This is the first paper I have ever presented before this Institute; possibly it may be the last one. I have worked very earnestly upon the subject and to receive Dr. Cattell's compliments—he being one of the senior members of the Institute—makes me feel amply repaid.

Dr. Bebb, of California, refering to that part of my paper which dealt with the four basalar temperaments said their consideration does not belong in the course outlined. Dental Anatomy in our college is taken up in the freshman class at the same time that the general anatomy course begins. I begin my course in dental anatomy by giving descriptions of the tissues which help to form the oral cavity, and to do this I must consider the anatomy of the head and face. In doing so I do not think I overstep the bounds which are inscribed by the chair of Dental Anatomy, even though I describe the physical characteristics of the four basalar temperaments.

Dr. Noyes mentioned the laboratory teaching, and says I have indicated in my paper that the principal teaching of Dental Histology is instituted in the lecture room. I do not mean to infer that at all. In the first place, I said in my paper that before my work in Histology is taken up in the lecture room the general Histological laboratory work has been in progress at least two months . My first lectures are upon Dental Anatomy, then later in the year I give my lectures in Dental Histology—the laboratory work having preceeded me at least two months. The Histological Laboratory work is carried on by another teacher. In my work at the college at this time I am dwelling upon the anatomy of the teeth. After Christmas I shall begin the didactic work in Dental Histology. General Histological Laboratory work begins at the first of the year and by the time that I begin to lecture on Dental Histology the class will have been over the work in the laboratory and my lectures will be a review of the work in a theoretical sense. It seems to me that this is the best arrangement of outline I have ever seen, therefore I follow it as indicated. I try to follow the work as outlined in Broomell's Anatomy and Histology of the Mouth and Teeth. However, I rearrange it, in a way. For instance:—In Dr. Broomell's book, he gives, first, a description of the bones, then the development of the bones, and later he takes up the attachment of the muscles. My plan is to describe the disassociated bones, at the same time I outline the muscular attachments on these bones; then I use the articulated bones in the articulated skull to show the relation of the bones to each other, at the same time point out the attachment of the muscles to the bones in articulation.

The laboratory work of carving the teeth in ivory, and the dissection of teeth to show the pulp canals and pulp chambers etc. is done in Dr. Byram's technical laboratory. My lectures on the Anatomy of the teeth preceeds Dr. Byram's laboratory work, thereby giving the student an idea of what to expect when he comes to the dissection.

The work in Dental Anatomy, Histology and Embryology should be given, each subject independent of the other two. It seems to me that either of the subjects, treated exclusively, would furnish subject matter for one paper, but in the work as I have presented it, it is in a condensed form and describes the way I proceed with my lectures in the college.

I thank you for your attention.

REPORT ON THE NOMENCLATURE OF OPERATIVE DENTISTRY.

BY DR. C. M. WRIGHT, CINCINNATI.

When Dr. Guilford asked me to help the Commission on Nomenclature, in the department of Operative Dentistry, by giving authoritative definitions to words belonging to this department, I did not fully appreciate the difficulties in the way.

As I looked over the text-books and magazine articles on Operative Dentistry I found that words and terms belonging to, or relating to this one great branch of dentistry, would include a description of instruments, tools, machines and orthopedic appliances, the correct names of which can be found in any complete catalogue of dental goods.

Such words the Commission certainly did not want. The next idea that required investigation was, are the words employed in the the surgical, anatomical, pathological and bacteriological branches of this broad science and art of Operative Dentistry, the sort that would be acceptable to the Committee?

I concluded that these would form a better basis for future work.

I consequently made a list of over a hundred words with their definitions, arranged in alphabetical order on cards, after the method of the card index or record.

I believe that by this method your editor could easily run over the cards and drop those that were of no importance.

A sheet report could readily be made from the remainder.

In my work I have consulted as authorities, medical and general dictionaries, encyclopedias and articles in the dental journals, and have tried to reduce the definitions to the modern and recognized uses which educated dentists make of them.

I am aware that mistakes and inaccuracies in the employment of certain words are liable to creep into general use, and I have tried to direct attention to a few of these.

The words "prophylactic" and "prophylaxis" are certainly misapplied by some prominent dental writers of today. When we remember that these words refer distinctly to means and methods which come before disease—that they definitely refer to prevention of disease and not at all to curing—such phrases as "oral prophylaxis treatment of diseased gums," or "oral prophylaxis treatment of Pyorrhea," are so obviously wrong and meaningless, that no one would be guilty of employing them after attention had been directed to the fault.

"Epulis", which means simply, **upon the gum,** is a word which I think we as stomatologists have a right to fix in its proper place. It should be used only to define the **location** of any neoplasm which appears "upon the gum." Some authorities (medical) define a certain or uncertain kind of fibrous tumor which grows from gum tissue as Epulis. This should be corrected. Since the microscope has become an indispensable instrument in differential diagnoses, all tumors upon the gums can be classified by an examination of their histological elements. They may be fibrous, sarcomatous (round, spindle or giant celled), cancerous, mixed (osteo-sarcoma), etc., so that we need recognize no class named "epulis", excepting as the the term **locates** any of these tumors "upon the gums."

The word "inflammation," has been the subject of much discussion by ancient and very modern writers. The reactionary phenomena presented by the circulation of the blood in the neighboring blood vessels—in the exudates, and in the metabolism of extravascular tissues, are so pronounced in some tissues (notably in the common connective), that some pathologists do not place inflammation among the diseases. They look upon the succession of changes which takes place in an inflammed area as benign efforts on the part of the tissues to expel the irritant, and repair the damaged tissue. The processes denominated inflammation are certainly complex and morbid. They are not to be studied under the head of Physiology or the doctrines of **Health,** but under the head of Pathology, or the doctrines of disease. One of your members has (if I am not misinformed) made "Pathology" and "Inflammation" interchangeable terms. Without inflammation, injuries inflicted by accident or deliberately by the surgeon and often by the dentist would not be repaired. This true, but again inflammations form a very serious danger, imperrilling the entire system without any apparent useful purpose. Pneumonia, for instance, is often an unmitigated danger to life.

I have placed myself on the side of those who define inflammation as a disease. We treat inflammation by directing it, confining it, hastening it and supporting the system to bear it. This fact alone would to my mind, make the series of morbid processes called inflammation over the pathological side, no matter what its intentions or objects may be. I define it as a disease.

The same kind of discussion has been going on at intervals for years about the status of "dental caries."

Some distinguished dentists insist that dental caries is an injury but not a disease of enamel and dentin—and that the insignificance of reactionary efforts on the part of neighboring tissues makes this distinction clear. I have defined dental caries as a disease—a disease of special tissues, enamel and dentin.

Inflammations of common connective tissue, of epithelial, of mucous and of osseous tissue present markedly different phenomena depending upon the morphology of the special tissue involved.

Dental caries is unique, because the tissue attacked is unique, but it is a different disease, a distinct departure from the normal morphology and function of round and healthy dentin, and I classify a decayed as a diseased tooth.

When I excavate carious dentin, I am curetting and removing necrotic and diseased tissue, and when I place creosote or phenol, or silver nitrate into the cavity after excavation, I am treating the injured tubules with the objects (in living teeth) 1st, of stimulating the protoplasm to protective efforts, and, 2nd, of making the formed material inert and sterile a field for baccilli. In dead teeth my object in using these medicines is to destroy the food qualities for bacilli of the dentin, to prevent recurrence of caries – a recurrent disease.

I am aware that just here I may be asked if a dead tooth, or a piece of carved ivory can be subject to disease – for pulpless teeth and ivory teeth in the mouth decay in the same way as do living teeth.

It may be hair splitting sophistry or a far-fetched proposition if I should reply, by asking if a carious sequestrum of bone lying in the tissues, or dead and actively decomposing pus in a sac, or the

dead diptheretic membrane which is furnishing a breeding and feeding ground for millions of cocci are healthy tissues?

The doctrines of disease include the study of Etiology as well as of morbid anatomy—and caries of dead teeth is so intimately allied to all dental caries in relation to **Etiology** that I do not feel that I have so far over-stepped the boundary of a clear definition of disease, when I speak of the carious dead tooth as a diseased tooth. A rotting gate post is not functionally and structurally sound.

The dispute about the definition of Inflammation and Dental Caries may continue thro' eternity. I therefore have obstinately defined each as a **disease,** in my list of words for the Commission on Nomenclature without going into a defensive and interminable argument.

The work that I have done is tentative. It should have been done by an expert. I have never before attempted anything like it. At times one's critical judgment seems to be all at sea. If two or three men could get together, work together, compare, criticise and quarrel over each other's definitions and fine shades of the meaning of words, there might be some valuable results in the way of fun in it, but alone in the midst of college duties, dental society duties and daily practice, it is not much more inspiring than Mantillini's job at the Maugh.

Abscess, ab′-ses (N)—A cavity containing pus.

Absorbent, ab-sorb′-ent, (N & A) N—That which absorbs or sucks up. As, absorbent cotton, etc A—Producing absorption.

Absorption, ab-sorp′-shun (N)—Sucking in, as a sponge imbibes water.

Adhesive, ad-he′-sive (A)—Sticking to. Formerly used in dentistry to designate the cohesive quality of annealed gold-foil. Now considered improper. Gold is not an adhesive material. The cements are.

Aesthetics, es-thet′-ics (N)—An esthetic. The science of the beautiful and pleasing.

Alloy, al-loi′ (N)—A compound of two or more metals.

Alveoli, pl, alve′oli (al-ve′-olus)—The tooth socket.

Amalgam, a-mal′-gam (N)—A compound of two or more metals, one of which is mercury.

Anesthetic, an-es-thet′-ik (N)—A drug capable of producing insensibility.

Anneal, an-eel′ (V T)—To temper metals, glass or porcelain by heat. To heat gold for filling purposes, to drive off surface impurities and bring out the latent quality of **cohesion.**

Anchorage, an′-kor-age (N)—The points of fixation of fillings or artificial crowns or bridges.

Antiseptic, anti-sep′-tick, (N & A) A—An agent used to prevent decomposition or putrefaction. See **Disinfectant.**

Apical, ap′-ik-al (A)—Pertaining to the apex or conical endings of the roots of teeth.

Apposition, ap-o-zish′-un (N)—Contact of adjacent parts, as of teeth.

Approximate, ap-prox′-i-mate (A & V I)—Next to, nearest to. To draw near to. Occasionally employed by dentists to designate the distal or mesial surface of the teeth. See **proximal.**

Arch, artsh (N)—An arc of a circle. Any object in nature or art which is curved, like an architectural arch. The dental arch, the arrangement of the teeth in a bow shaped arc.

Asphyxia, as-fix′-se-ah (N)—Suspended animation from suffocation.

Bacillus, ba-sil′-lus, pl. Bacilli. (N)—A rod shaped bacterium. Miller- bacillus found in carious cavities of the teeth and in the tubuli of infected dentin.

Bacteria, bac-te′-ri-a (N)—A class of parasitic, microscopic fungi-destitute of chlorophyle.
In form they follow more or less closely three forms: (1) the sphere. (2) the rod and (3) the spirilla. Closely associated with several fermentations, putrefactions and special diseases in man.

Bibulous, bib′-u-lus (A)—Prepared to readily absorb, like paper, cotton, etc. Bibulous-paper. Absorbent, better term.

Buccal, buck′-al (A)—Pertaining to, or directed toward the cheeks. The surface of the teeth of either jaw lying next to the cheeks.

Bur, bur (N)—A small dental tool for preparing cavities for filling and operated by a dental engine.

Calcareous, kal-ka′-re-ous (A)—Composed of or containing calcium.

Calcic, kal′-sic (A)—Composed of calcium.

Clamp, klamp (N)—A device for holding parts together or in position. An instrument with jaws for grasping the neck of a tooth to retain napkins or rubber dam.

Calcific, kal-sif′-ik (A)—Forming lime or calcium. Calcifying.

Calculus, kal′-ku-lus (N)—The lime salts of the oral secretions deposited upon the exposed parts of the teeth and roots. As, salivary calculus and serumal calculus. A common medical term for stone as "gall stone." Renal Calculus, etc.

Caries, ka′-rees (N)—A term used by dentists for a local disease of the teeth. A definite kind of disintegration of the Enamel and Dentin, caused by the action of specific micro-organisms. Not similar to Caries of Bone, which is a form of Osteitis.

Carious, ka′-re-us (A)—A condition of tissue like enamel or dentin. Or, of a tooth, affected with the specific disease called Dental Caries. In medicine it refers to a condition of necrobiosis or necrosis.

Cataphoresis, kat-a-fo-re′-sis (N)—Introduction of medicine into the system through the unbroken skin, or the tubuli of the dentin of a tooth by means of an electric current.

Cement, se-ment′ (V T)—To fasten by an adhesive substance. An inlay or cast filling is cemented in place.

Cement, se-ment′ (N)—An adhesive filling material like oxy-phosphate, oxy-chloride of zinc, etc. See Cement.

Cementum, se-ment′-um (N)—Bone tissue with lacunac and canaliculi, but no Haversian canals, which surrounds and coats the roots of the teeth, as enamel does the crowns. True bone, nourished by a pericemental membrane.

Cleavage, cleav′-age (N)—The act of splitting the enamel in a certain direction. The line of easy fissure of enamel and crystaline bodies.

Coccus, kok′-us pl. coc′ci, kok′-si (N)—Sperical or nearly sperical bacteria.

Cohesive, ko-he′-sive (A)—A property of annealed gold (foil or crystal), which causes seperate particles to stick to one another, as tho welded, when placed in contact by light burnishing, or heavy hand or mallet pressure.

Cold-Welding, (A OR V. T.)—A term formerly used for a property of gold after annealing, by which cohesion is meant.

Combination filling—A filling composed of two or more separate materials, usually superimposed.

Cosmetic, kos-met′-ik (DENTISTRY—The artistic concealing of repairs of tooth tissues by the use of filling material and methods which tend to the hiding of dental work and deceive the casual observer.

Contour, kon-toor′(v-t) –To make a contour or outline of. To restore the original outline of a carious tooth by filling.

Contour, kon-toor′ (n)—The line bounding a figure or body, as the contour of a tooth.

Crucial, kru′-chal (a)—Cross -wise; like a cross, cross-shaped

Decay, de-cay′ (n)—Putrefactive decomposition. Vulgar form for dental caries.

Deceiduous, de-sid′-u-ous (a)—Liable to be shed at periodical stages of growth. Applied to the teeth of childhood.

Dental Caries, den-tal-ka′-ries (n)—A local disease of the teeth, in which the enamel is dissolved by the action of lactic acid as a waste product of specific micro-organism and the dentin is disintegrated by the vital activity of acid producing organism penetrating the dentinal tubules, see Caries.

Dentate, dent′-ate (a)—Having teeth or tooth-like projections.

Dentigerous, den-tij′-er-us (a)—Containing or producing teeth, as a dentigerous sac or tumor.

Dentition, den-tish′-un (n)—The eruption or the teeth, both deciduous and permanent.

Diagnosis, di-ag-no′-sis (n)—The art or process of determining the nature, location and causes of a disease. Getting a correct and intimate knowledge of a disease.

Dentin, den′-tin (n)—The main body of a tooth. The specialized connective tissue covered by enamel on the crown and cementum on the root.

Diagnosticate, or diagnose (v)—To investigate, that one may know all about a disease.

Diathesis, di-ath′-e-sis (n)—Predisposition to disease. A certain natural constitution of body by which a person is predisposed to certain particular diseases; as the Hemorrhagic D., a tendency toward profuse bleeding from slight cause. Gouty D., predisposition toward gout, etc.

Diathetic, di-a-thet′-ic (a)—Pertaining to Diathesis.

Differential Diagnosis, dif-fer-en′-shal di-ag-no′-sis (n)—The distinguishing between two similar diseases by comparison of their symptoms.

Disinfect, dis-in-fect′ (v t)—To destroy infectious matter. To free from infection.

Disinfectant, dis-in-fect′-ant (N)—An agent which destroys poisonous gases and the bodies from which they proceed. It destroys the specific contagia of disease. See Antiseptic.

Distal, dis′-tal (A)—Distant from the center. Used to define the location of surfaces and cavities in the posterior surface of the teeth, remote from the median line of the mouth.

Disk, disk (N)—Any flat circular plate. Dental disks are thin, circular pieces of paper, cloth or other substance charged with abrasive powder for cutting or polishing teeth and fillings.

Elevator, el′-e-va-tor (N)—An instrument for extracting roots of teeth.

Enamel, en-am′-el (N)—The calcified ephithelical tissue covering the crowns of teeth.

Engine, en′-jin (N)—A machine for applying power.

Epulis, ep′-u-lis- or ep-u′-lis (N)—A tumor upon the gum. The term Fibrous, Sarcomatous, Benign, Malignant, etc., are used to define the kind or class, as Fibroepulis, Sarcomato-epulis, etc.

Erosion, e-ro′-zhun (N)—An affected surface of the teeth characterized by a polished or smooth surface.

Esthetic, es-thet′-ic (A)—Pertaining to the science of Esthetics, or Aesthetics, which treats of the pleasing and beautiful

Esthetic Dentistry, (N)—Pleasing and beautiful dental operations aside from their purely practical function. Practically the concealing, by artful arrangement and the selection of materials of the work of the dentist.

Etiology, e-te-ol′-ogy (N)—The science of the causes of disease. This includes predisposing and exciting causes—remote and near, general and local—hereditary and immediate or acquired. It deals with causation.

Excavator, ex′-ka-va-tor (N)—A delicate hand-tool for removing carious dentin and shaping cavities.

Extraction, ex-trac′-shun (N)—The forcible removal of a tooth or part of a tooth from its socket.

Ferment, fer′-ment (N)—A substance which causes physical and chemical changes in other substances with which it comes in contact.

Fermentation, fer-ment-a′-shun (N)—Physical and chemical changes induced by a ferment.

Festoon, fes-toon′ (N)—A wreath-like outline of the margin of the normal gum around the necks of the teeth.

File, fil (N)—A hard, steel abrading or polishing tool

Filling, fill′-ing (N)—A material like gold, amalgam, gutta-percha, cement or tin for filling a prepared cavity in a tooth. Synonyms. Stopping; plug.

Filling, fill′-ing (V)—The act of placing certain filling materials into a cavity of the tooth or roots of teeth. Synonyms, plugging, stopping.

Fissure, fish′-shur (N)—A crack or narrow parting or opening in a tissue. An irregular depression or crack in the enamel of the teeth. See Sulcus.

Fistula, fis′-tu-la (N)—A pipe-like ulcer leading from an abcess to the surface of the skin or mucous membrane. The term sinus is now sometimes used for fistula.

Foil, see gold-foil—.

Forceps, for′-seps (N)—An instrument having two jaws, and handles designed for the extraction of teeth.

Gingival, jin-ji′-val (A)—Pertaining to the gums.

Gingivitis, jin-ji-vi′-tis (N)—Inflammation of the gums. Catarrhal G., of the nature of catarrh. Interstitial G., affecting the interstices of the connective tissue supporting the gingiva.

Gold-foil, foyl (N)—Very thin sheets of gold used for tooth filling.

Hematogenetic, hem-a-to-jen-et′-ik (ADJ)—Produced in the blood. H., Calculus, Calculus produced in the blood; serumal tartar. Dark brown or green accretious of calcareous substance found on the roots when they are affected with pyorrhea. Different in color and consistency from **salivary** calculus.

Hemorrhage, hem′-or-raj (N)—Escape of blood from the vessels. Capillary H., from the capillaries. Venous H., from the veins. Arterial H., from the arteries.

Hemostatic, hem-os-tat′-ik (A)—Checking the flow or escape of blood.. (N)—Something that will check the escape of blood.

Hyperaemia, hi-per-e′-mia (N)—An excess of blood in any part. Physiological or pathological. A local congestion of blood in the vessels and of an exudate in the tissues; extravascular.

Hypersensitive, hyper-sen′-si-tiv (A)—Excessive sensibility to irritation; thermal, chemical or mechanical. Hypersensitive pulp. H.,dentin.

Immediate root filling, (N)—Root filling inserted immediately after pulp removal.

Impacted teeth, (N)—Teeth confined in the jaw and prevented from erupting.

Implantation, im-plan-ta′-shun (N)—The operation of forming an artificial alveolus and inserting in it a natural tooth.

Infection in-fec′ shun (N)—Contamination by air, water, clothing food, etc., which contains poisonous matter, such as disease germs. See Contagion.

Infectious, in-fec′-shus (A)—Capable of infecting; likely to communicate disease.

Inflammation, in-flam-ma′-shun (N)—A pathologic condition of living tissue, in which a succession of vascular, circulatory and tissue changes of a part follow injury from mechanical or chemical irritants..

Inlay, in′-la (N)—A porcelain or metal filling prepared by fusing or casting, for inserting in a hollow or cavity prepared for it in a tooth.

Interproximal inter-prox′-i-mal (A)—Between adjoining surfaces. The space between adjoining teeth.

Labial, lab′-i-al (A)—Pertaining to the lips. The surface of the incisors and cuspids presenting toward the lips.

Lancet, lan′-set (N)—An instrument with small blade for incising soft tissues.

Ligature, lig′-a-ture (N)—Anything that binds. A cord or thread for tying blood vessels, or for tying around the teeth.

Lingual, lin′-gual (A)—Pertaining to, or in the neighborhood of the tongue. Lingual surfaces of the teeth are those presenting toward the tongue.

Massage, mas-sahzh′ (N)—Systematic friction for the purpose of preventing or curing disease. Friction of the gums with finger, finger-cot, or specially designed brush, as a prophylactic measure.

Masticate, mas′-ti-kate (V)—To reduce to a pulp by a trituration and mixing with solvents, as in chewing food, and in the insalivation of same in the mouth.

Mastication, mas-ti-ka′-shun (N)—The act of triturating the solid food-stuffs between the teeth till they are reduced to a pulpy mass, prepared for easy deglutition. One of the functions of the teeth.

Matrix, ma′-trix, pl. mat′-ri-cez (N)—The mold in which anything is formed. A platinum or gold lining of a cavity in which a porcelain or gold inlay is fused or baked. The mould in an investment into which gold or other metals are cast.

Mesial, me′-zi-al (A)—Middle; directed toward the middle or median line. Surfaces of teeth facing toward a point between the central incisors.

Metabolism, me-tab′-o-lism (N)—The sum of the nutritive processes in cells, organs and organisms. It includes the vital phenomena of absorbtion and assimilation on the one hand and the liberation of energy and waste on the other.

Malocclusion, mal-ok-klu′-zhun (N)—The occlusion of the teeth not in accordance with anatomical rule

Mallet, mal′-let (N)—A tool designed to give a sharp impact

Mandrel, man′-drel (N)—A shaft or spindle in which a tool is held for rotation.

Mummification, mum-mi-fi-ka′-shun (N)—The shriveling of organic tissue by means of drugs, thus rendering it immune to putrefaction.

Micro-organism, mi′-kro (N)—A minute living animal or plant only seen by a lens or microscope.

Mucosa, mu-co′-sah (N)—Mucous membrane.

Mucus, mu′-kus-(N)—The viscid secretion of mucous glands

Necrobiosis, ne-kro-bi-o′-sis (N)—The progressive atrophy and decay of a tissue or organ—as Necrobiosis of gingival tissue. Necrobiosis of margins of the alveolar process.

Necrosis, ne-kro′-sis (N)—Local death of a part of a tissue (especially of bone). Also the death of an organ like the dental pulp. "Necrosis of the pulp." "A necrotic pulp." Necrosis of the pericemental membrane, etc.

Necrotic, nee-krot′-ic (A)—Pertaining to necrosis or local death.

Necrotomy, nee-krot′-o-my (N)—The excision of a sequestrum. The cutting out of a necrotic pulp. The cutting away of dead alveolar borders.

Nerve, nerv (N)—"Nerve of a tooth." A common name for the "pulp" or dentinal pulp. Incorrect and obsolete.

Necrosis, ne-cro′-sis (N)—Death. Usually applied to areas of bone·

Nomenclature, no′-men-kla-ture—A system of names or naming, especially one used in a particular art or science.

Neuritis, nu-ri′-tis (N)—Inflammation of a nerve.

Neuron, nu′-ron (N)—The element of nervous tissue—consisting of the nerve cell and its protoplasmic branches—like the axis-cylinder and the dendrites.

Neurosis, nu-ro′-sis (N)—A functional disease of the nerves.

Non-adhesive, (A)—Improperly employed for "non-cohesive." Obsolete.

Non-Cohesive, ko-he′-sive (A)—Not having the property of co-hesion. A form of pure gold in which the natural property of co-hesion has been destroyed.

Occlusion, oc-klu′-zhun (N)—The act of closing or shutting. The closing of the teeth. "Correct occlusion," the normal contact of the teeth of each jaw when the mouth is closed

Occlusal, oc-klu′-sal (A)—The surface of the teeth which approximate when the jaws are closed.

Operative Dentistry, (N)—The department of dentistry in which manipulations, mechanical or surgical, are made in the mouth of the patient, as distinguished from those which are made in the work-shop and laboratory.

Organism, org′-an-ism (N)—A living creature. A one-celled creature or a complex many-celled creature.

Orthodontia, or-tho-don′-she-a (N)—The moving of malposed teeth to a correct position. The art of regulating the position of the teeth.

Orthopedia, or-tho-pe′-di-a (N)—The correction or prevention of deformities of the face, by orthodontic measures.

Palatal, pal′-at-al (A)—Pertaining to or directed toward the palate. "Palatal surfaces of the teeth." Discarded for the term "lingual".

Pericementitis, per-y-ce-men-ti′-tis (N)—Inflammation of the pericemental membrane: Acute P. Chronic P. Phagedenic P.

Pericementum, pery-se-men′-tum (N)—The membrane covering the cementum of the roots of teeth. It supplies nutrition to the cementum, as periosteum does to the bone. A vascular, cellular and fibrous membrane.

Plaque, plak (N)—A flat circumscribed area or plate; a flat plate made up of a colony of micro-organisms and adhesive inter-cellular substance, fastened or clinging, or cemented to enamel of the teeth.

Plastic, plast′-ik (N)—In dentistry, a material easily modeled and built into form.

Plastics, plast′-iks, pl. (N)—Materials like cements, gutta-percha and amalgam for filling cavities in teeth.

Plug, (N & V T)—An obsolete word for a filling in a tooth—and for the act of filling a tooth.

Prophylactic, pro-fi-lack′-tick (A)—Tending to prevent disease, guarding against disease. Hindering healthy tissue from disease. (N)—A medicine or preparation which defends or protects against disease. Something applied to healthy tissue to prevent disease.

Prophylaxis, pro-fi-lax′-is (N)—Preventive medicine. Oral prophylaxis—Preventive measures against oral diseases. Preventive dentistry.

Proximal, prox′-im-al (A & N)—In dentistry formerly used to define the location of cavities between the teeth as anterio-proximal for mesial surfaces and cavities; posterio-proximal for distal surfaces and cavities.

Pulpitis, pulp-i′-tis (N)—Inflammation of the dental pulp.

Putrefaction, pu-tre-fac′-shun (N)—Decomposition of animal or vegetable matter effected largely by the action of micro-organisms. Impossible to occur without exposure to micro-organic life.

Pulp, (N)—Dental P., or Dentinal P. The vascular, cellular, and sensitive organ of nutrition of the dentin of the tooth. It is also the formative organ of the dentin.

Pyorrhea, py-or-e′-a (N)—A flow of pus. "Pyorrhea alveolaris." A flow of pus from the Alveoli of the teeth. One of the stages of an inflammatory disease of the pericemental membrane and the gingiva.

Resorption, re-sorp′-shun (N)—A term used to distinguish the absorption or drinking up of excreted matters, from the absorption of nutritious solutions, medicines, etc. **Resorption** of the roots of deciduous teeth.

Sac, sak (N)—A bag-like abcess at the apex of a root of a tooth. In common use.

Scaler, ska′-ler (N)—A dental instrument for the removal of calculus from the teeth.

Schizomycetes, siz-o-my-ce′-tez, pl. (N)—Bacteria, a class of vegetable micro-organisms that multiply by fission (fission fungi). They are parasitic fungi and cause putrefaction. Are causes of many specific diseases in man.

Scaling, (V)—The removal by special instruments of scale-like deposits of "tartar" on the crowns and roots of the teeth. A curetting process.

Septic, sep′-tik (N)—Poisonous matter produced by putrefaction. A poison; disease producing matter.

Serumal, se-ru′-mal (A)—Pertaining to the serum of the blood. Derived from serum. Serumal calculus. Tartar on the roots of teeth derived from the blood.

Sinus, si′-nus (N)—A hollow, a recess, a cavity.

Sprue, spru (N)—A piece of metal or wood used by a molder in casting metals, to form the ingate for the molten metal; used to form the passage or ingate for making an inlay of cast metal, gold, etc. Invested as attached to the wax model of an inlay and drawn out when the investment is "set."

Sterile, ster′-il (A)—Not containing micro-organisms; aseptic.

Sterilize, ster′-il-ize (V)—To thoroughly cleanse; to make an instrument, or the hands and nails and tissues aseptic. To remove absolutely from a part all micro-organisms and septic matter.

Sterilization, ster-il-i-za′-shun (N)—The process of freeing a substance from septic germs.

Stomatitis, sto-ma-ti′-tis (N)—Inflammation of the mouth—mucous membranes covering palate and gums.

Stomatology, sto-ma-tol′-o-gy (N)—The sum of scientific knowledge concerning the mouth.

Stomatologist, sto-ma-tol′-o-jist (N)—One who knows about the health and disease of the mouth.

Stomatomycosis, sto′-ma-to-my-co′-sis (N)—A mouth disease due to schizomycetes.

Stopping, (N)—A word still used in England by some writers for the modern term "filling."

Sulcus, sul′-kus (N), pl. sul-ci—A natural furrow or groove in the enamel of the teeth. Not a fissure.

Tartar, tar′-tar (N)—A calcareous substance deposited on the teeth from the saliva. A mixture of lime-salts, salivary mucus and animal matter.

Tubuli, tu′-bu-li, pl. (N)—The minute tubes which form the dentin, radiating from the pulp chamber and root canals to the inner surface of the enamel on the crown and the cementum on the root.

Ultitis, u-li′-tis (N)—Inflammation of the gums. See gingivitis.

My Dear J. Q.

Your two letters are before me. It is very kind of you to submit your discussions to me.

You made your ideas very clear in your first letter upon "overlap," and "lingual" in place of "bite of tooth" which I thoroughly understand, but I blundered in expressing myself. I meant to approve of your ideas, and at the same time call your attention to the use of the words "upper" and "lower" in place of "superior" and "inferior."

Base-Metal.—I do not consider this word or its definition of much importance to us as teachers or practioners. However, there is a principle underlying it that I believe should be given careful consideration. The principle is: Similar definitions or those varying only in a word or a prefix should be avoided if possible, as they are confusing to many minds. When I began the teaching of metallurgy I liked the text-book definitions of noble and base metals because they seemed so perfectly distinct and easy for me to remember; but I soon found that there were quite an appreciable percent of the students stumbling over these and similar definitions, hence, I improvised the one for base-metal. A noble metal is one which does not combine with oxygen by heat alone. A base-metal is one, not of the noble metals; any metal except Hg. ,Au., Ag. and the Pt. group. These two definitions are entirely dissimilar. The one (noble metal) states the essential property of its class, and implies that there is another class embodying the opposite property. The other (base-metal) states that all metals that have not the noble-metal property are base-metals; also that all metals except three metals and a group of metals are base-metals. I know this definition is not classical, but it accomplishes the work for which it was designed. I trust some better method may be suggested for overcoming the difficulty of which I speak.

Base, Base-Plate and Bite-Plate.—You must remember the chapter in the text-book was written in 1903, sometime before I thought of becoming an oracle (???) upon words. However, in compiling the glossary I did not give these terms any consideration only considered they were so nearly synonmous that one definition would cover all; and that definition was taken from the report of the Nomenclature Commission of 1896, and the Standard Dictionary. I would like to see "bite-plate" dropped entirely, and think it may be well to make the distinction between base and base-plate. The definition for base (as applied to plate work), it seems to me, is perfect; but can't you find another definiton for base-plate? They are so similar that they will confuse the large majority of students unless the teacher spends more time in drilling the class upon these words than the thought is worth. I have nothing to suggest.

BITE.—I wish this term could be dropped, unless it is confined to that abominable thing variously known as the "mush," "quash"or "hunk" bite. Could we not use the term Model-plate? It is a model plate because it is something to be copied or reproduced in outline, but of course it has not the detail. The model-plate may be constructed of any material, as plaster, modeling compound, wax, parafin wax or any base-plate with these materials added to represent the artificial denture in outline, but not in detail. A distinction would necessarily be made between "model-plate" and "trial-plate." The model-plate would be the term substituted for bite, while the trial-plate or denture is the artificial denture in process of construction ready for trial in the mouth so as to perfect the articulation, contour and expression. See if you and Dr. Guilford cannot do away with "bite".

"Near shoulder" and "far shoulder" seem at first thought good terms.

CROWN CLASSIFICATION.—I like your classification except "post." I insist that post (properly used) is that to which a thing is attached, not by which. The horse is hitched to the post. The boards are nailed to the fence post. If we are to use the word at all in crown work, the term should be applied to the root or prepared stump. Used in place of abutment or anchor tooth. Talk with Dr. Guilford about this word. Dowel not dowel pin. In the glossary I only spoke of Dowel-pin in brackets. It should not be used. The pin of which we are speaking is not a base or support, it is not that to which the crown is attached, for the crown is attached to the root or stump; but it is a coupling pin, hence a dowel. Take up this word with Dr. Guilford. John, I know I am right, there now!

DENTAL PORCELAIN.—I like your modification and will accept your ideas. A suspension of one or more partially fused silicious substances in a fused silicate or silicates. However, I want to insist that when all the ingredients of porcelain are fused it becomes glass, though it may be very high fusing and opaque.

INGOT.—As I gave it in the glossary it was taken from the eport of the Commission of 1896. The Standard Dictionary gives it: "A mass of cast metal from the mold or crucible." I think this is the better definition.

Now my dear John, I am going to begin a prayer for **Prosthesis** (not dental prosthesis), and I am going to keep it up until I get a telepathic message from you that the last word has been said, and the final vote taken.

Let us consider Dental Prosthesis: It is far superior or preferable to Prosthetic Dentistry, but Dental is from Dens—a tooth—tooth restoration: I will confess, that is all that can be said for the work of too many dentists, but John, I am a prosthetist, and I see so much more in this department of our profession than just restoring teeth, and I believe I do more; if I do not I am a complete failure, for I am trying to do so much more. I want to teach this larger, broader field; I want the whole profession to comprehend the possibilities of prosthesis. I am sending you pictures of several prosthetic appliances, and one illustration of their application. The three photos give different views of a complete artificial denture for a cresent shaped face. They made a wonderful improvement.

John, spread these pictures out and gaze upon them long and steadily, don't blink, and they may hypnotize you into an ardent supporter of that broad term Prosthesis, and get you away from that little pinched term tooth (dental) prosthesis.

PROSTHESIS—PROSTHESIS—PROSTHESIS.

Kindly return the pictures to me. Wishing all our brothers a Happy New Year, a pleasant and profitable meeting, with my love to everybody, I remain

Sincerely yours,
GEO. H. WILSON.

I am sending you a few notes on Dr. Wilson's report of last year. When the subject comes up for discussion, please present these as my comments.

They are what I would offer were I present.

AUTOGENOUS.—An excellent term.

BASE—BASE-PLATE.—I entirely agree with Dr. Byram that the words "bite and bite-plate" should be done away with. Manufacturers sell base-plate wax and base-plate gutta-percha, and we know what they are used for—provisional or temporary purposes.

We mount teeth, however, and attach them to a vulcanite base or a gold-base, etc. Trial-plate is not a bad term, but base-plate conveys the idea just as well.

Carat.—Should be spelled with a "C," not "K".

Cross Pin.—(Tooth) should be included in Wilson's list and defined.

Cast vs. Model.—Neither word defines the word accurately under all conditions. If we follow the sculptors we would say Cast, but a zinc die and cast gold inlay are also casts. Model is so generally used by Orthodontists and others that I believe it should be adopted to the exclusion of cast.

To say model for a metal plate and cast for a vulcanite is confusing to the student. I have found it so, and many others have. Dr. Wilson's definition of curve is good.

Alinement, c.—labial, c.—buccal, c.—compensating, c.

I also like Dr. Wilson's proposal to use Substitute (or Sub.) for dummy, I approve of

Gage is better than gauge.

Impression Tray is better than cup.

Lower is to be preferred to inferior.

Prosthodontia, as a compound derivative is not well constructed as Dr. Wilson has pointed out. Prosthesis I consider infinitely superior.

Hard Solder should be included and defined.

Velum Rubber is a better term than soft vulcanite.

Am sorry I cannot be present to hear the general discussions.

I am very truly yours,

S. H. Guilford.

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